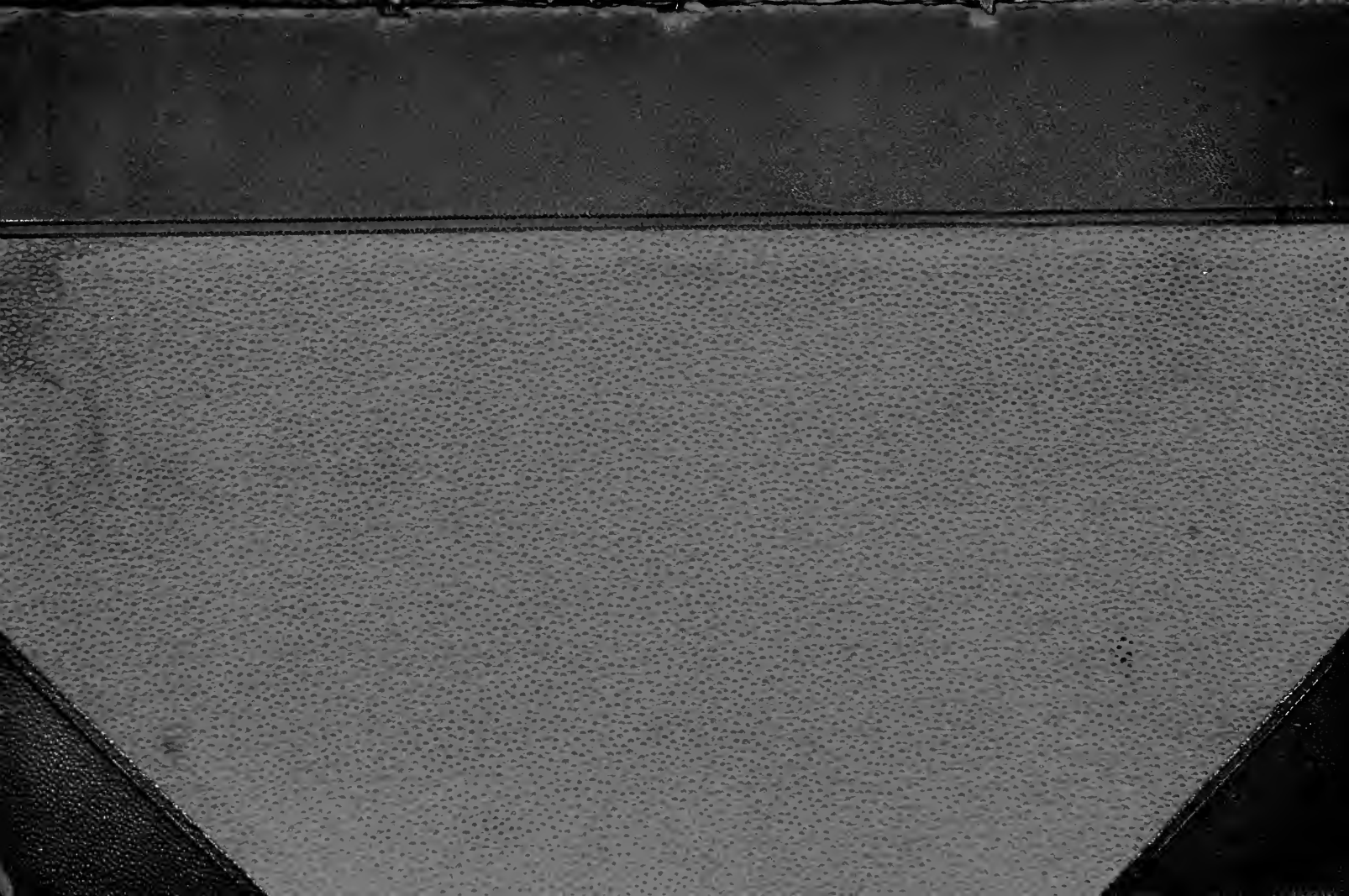
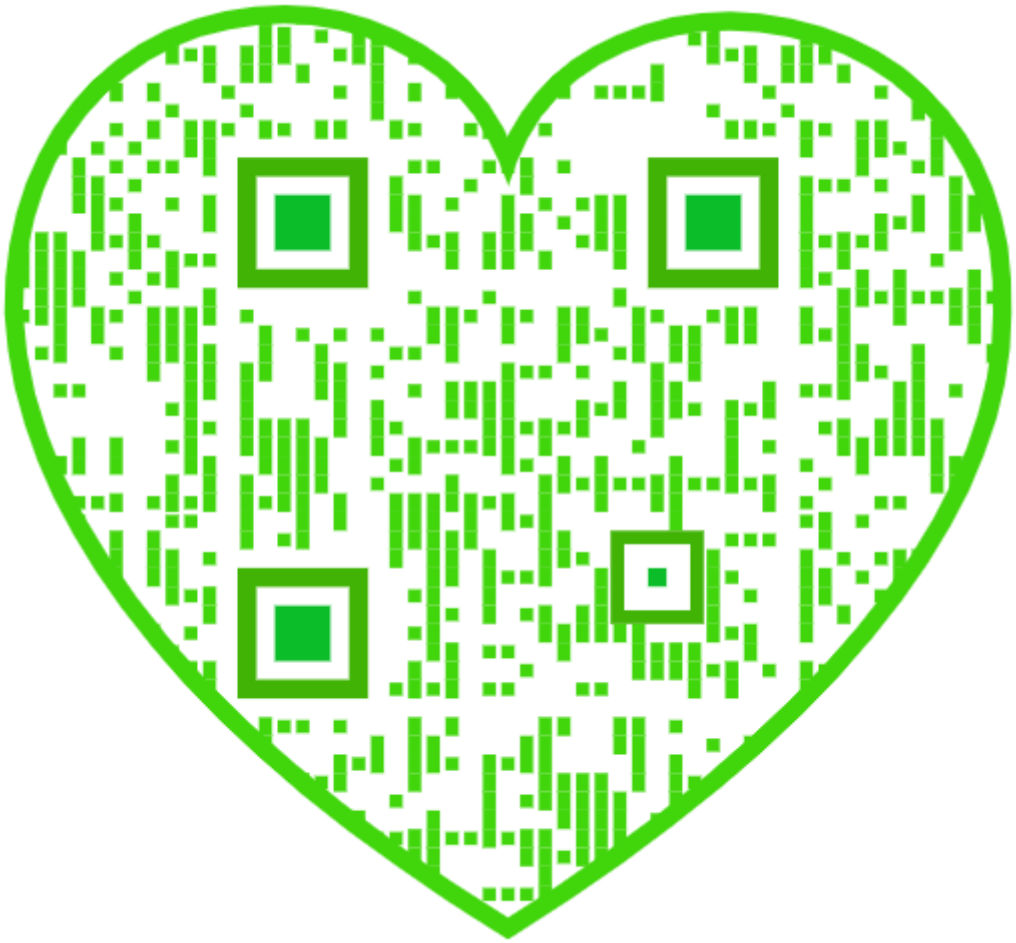




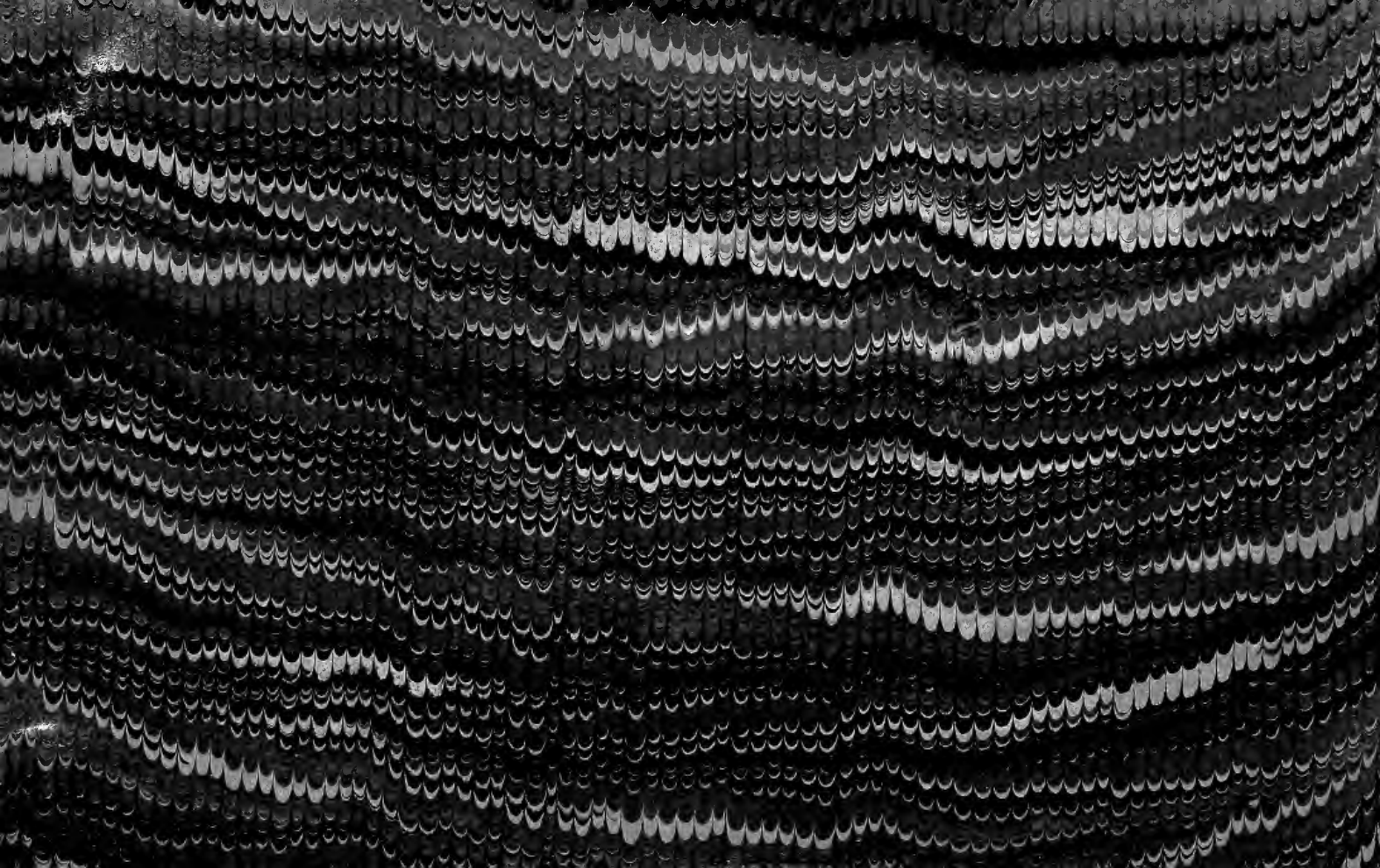
LIBRARY OF CONGRESS.

CHAP. SF515

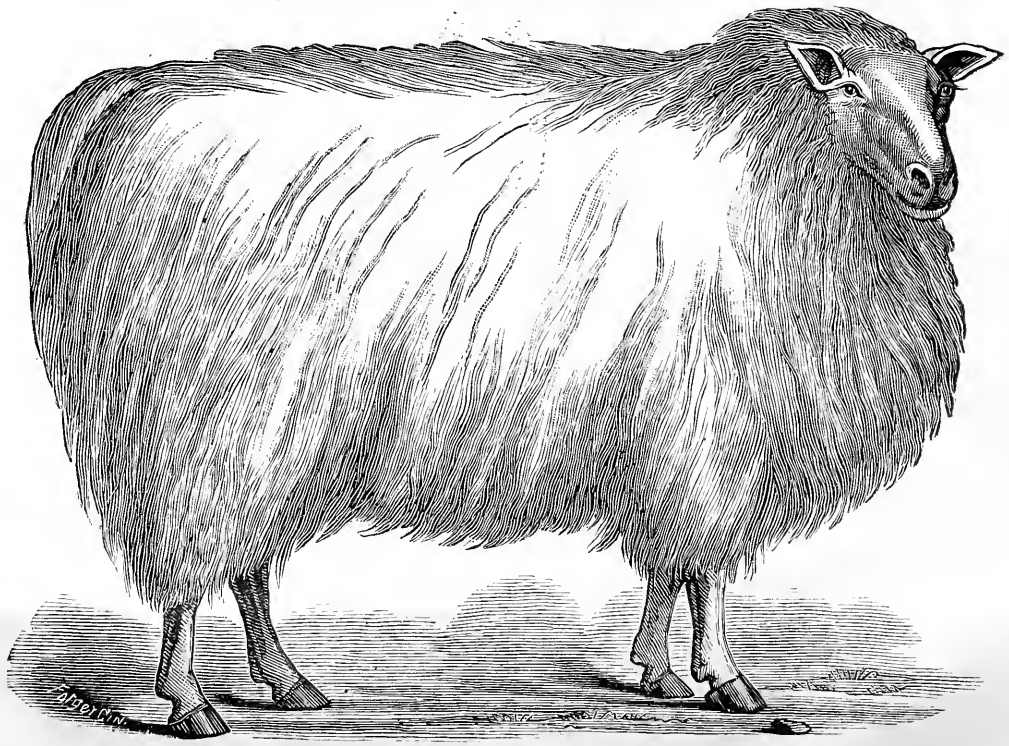
SHELF .I5

UNITED STATES OF AMERICA.

9—167



IMPROVED TENNESSEE SHEEP.



QUEEN OF AMNICOLA.

Two years old Ewe, bred and owned by Tom Crutchfield, Esq., at Amnicola, Hamilton county, Tennessee.

SHEEP HUSBANDRY.

A WORK

PREPARED FOR

THE FARMERS OF TENNESSEE.

LIBRARY OF CONGRESS
CITY OF WASHINGTON.

BY

J. B. KILLEBREW, A. M., Ph. D.,

Commissioner of Agriculture, Statistics and Mines for the State of Tennessee.

NASHVILLE, TENN.:
TAVEL, EASTMAN & HOWELL.
1880.

SF375
.K5

To His Excellency, Gov. A. S. Marks:

The numerous enquiries which I have received, asking for information pertaining to the capabilities of the State for sheep husbandry, have induced me to prepare the following pages. I am indebted to my former clerk, Major H. N. Caldwell, for much valuable aid in the preparation of the volume; also to Dr. W. M. Clark and to B. M. Hord, both of whom have contributed largely to the work. All the best American authors, Hays, Stewart and Randall, as well as the best European writers on this subject, have been freely consulted, but the most useful part of the work has been derived from the observation, experience, and practice of our own flock-masters, who have no superiors in this or any other country. Their intelligent management has been recognized and approved in the best sheep growing districts of Europe, and their experience furnishes a mine of valuable information, which cannot be disregarded with impunity by those entering the business in our State. Trusting that the work may aid in the furthering of an industry which is both a pleasure and a necessity to civilized man, I have the honor to be,

Very truly,

J. B. KILLEBREW.

February 20, 1880.

SHEEP HUSBANDRY.

CHAPTER I.

HISTORY AND GENERAL VIEW OF THE SUBJECT.

The question as to the capability of Tennessee as a sheep growing section has long been settled, and, therefore, it is unnecessary to bring forward any arguments on the subject. Not only is this State well calculated to make sheep husbandry profitable, but it has claims in an especial degree that are not possessed by any other States of our Union. This industry has of late years received an impetus not hitherto known, from the introduction of a system of railroads all over the United States. Before their general construction lambs could be bought at any time for one dollar apiece, in fact, the farmer considered himself amply re-remunerated if he secured that price. Now, the great markets of New York, Boston, Philadelphia, and, in fact, all the northern and eastern cities, from Louisville and Cincinnati to St. Paul and Portland, in Maine, draw their early lambs from the more genial climes of the South, and so great is the competition that the farmer who has large fat lambs to sell in May or the first of June can get from three to four dollars apiece. Nor does the market cease with the early ones, but extends through the entire summer for all grades of lambs, and later for fat ewes and wethers.

This stimulus has acted so strongly upon sheep raising that no farmer should, or does, think his farm stocked without a flock of sheep ranging from a score or two to several thousand, according to the capacity of the farm or range. And not only has it shown itself in the increased numbers raised, but it has acted in a wonderful manner in improving the stock or character of the sheep.

But few animals can show a greater diversity of character than sheep. This difference is shown in color, size, shape, length and texture of wool, etc, nor does any animal whatever occupy a larger territory, living everywhere that man does on the habitable globe. They are found on the bleak mountain sides of Greenland, and on the broad deserts of Africa. Nor does this great diversity cease in these particulars, for no domestic or wild animal is capable of existing on more different sorts of food. Weeds, grasses, shrubs, roots, cereals, leaves, barks, and even, in times of scarcity, fish and meats, all furnish a subsistence to this wonderful animal. They will, in the great pine forests of Norway and Sweden, subsist upon the pungent resinous evergreens through a hard winter, such as are unknown to this latitude. The cultivated grasses of the temperate zones, clover, and the ceerals are, as a matter of course, the best food for them, but in the absence of these they will gnaw the barks and crop the leaves of the forests. Among the Laplanders, when all other kinds of food fail, they will eat the dried fish of those people, or the half rotten flesh of the walrus; or, in cases of extreme destitution, they will eat the very wool off each other's backs.

The sizes of sheep are as various as the kinds of food they live upon. In the Orkney Islands they are so small as to appear like toys. Like the diminutive ponies of the Shetlands, neighbors of the Orkneys, they are brought to the warmer climates as a curiosity. By the side of the massive Cotswold or Southdown they appear very little like the same species. Some have long, tapering, straight horns,

like the gazelle, while others have the huge spiral horns of the mountain, or big horns of the Osage Mountains. Others, again, are without horns altogether, as are most of mutton sheep.

The same difference exists in regard to the tails. They have long, slender, vibrating tails, a broad, flat tail like those of Asia, or no tail at all, only a rudiment of one being discernable. In some countries the tail attains a weight of from seven to twelve pounds, and is considered a great delicacy.

And thus with the covering. It hardly seems possible to connect the straight, hairy fleece of the Rocky Mountain sheep and the long, combing wool of the Leicester or Cotswold, in the same animal. In Madagascar the sheep have short, hairy wool, hardly to be considered wool at all. In Lincolnshire it is long and coarse. In Saxony it is almost like silk, fine, curly, and lustrous. In Angola it is furry and soft as a rabbit's fur. Nor does the diversity stop here. In our own country we meet with the white and black sheep. About the Cape of Good Hope they are gray, dun, brown, buff, blue, and all intermediate shades of color. This great difference of color results from long breeding under many different climates and modes of feeding.

The uses to which these animals are applied seem to partake of the great diversity of their characteristics. The meat forms one of the standard dishes of the world. For luscious juiciness, ease of digestion, and delicacy of flavor it has no equal. Agreeable alike to the invalid and to the laborer, it is eagerly sought by all classes. Nor is its flesh the only thing about it that forms a diet of man. Some nations use, to a large extent, the milk of sheep as well as of cows and goats. Excellent cheese is manufactured from it, and its use is thought by some physicians to be a specific diet in obstinate cases of dyspepsia. Even the wool is considered a choice dish by some of the Highland clans of Scotland. They scorch it to a crisp brownness, and eat it

with great relish. The use of ewe's milk in preparing cheese, butter, and curd is alluded to in the Book of Job. The writers of profane history often speak of ewe's milk. The ewe's milk cheese has a sharp, strong taste, that, like Limberg cheese, commends itself to the taste of many people. It is often mixed with cow's milk in the manufacture of some brands of cheese, to give it a tartness not given by cow's milk alone. The butter is a pale yellow, less firm than cow's butter, and becomes rancid much quicker. The milk is thicker than cow's milk, but in other respects resembles it very much, both in taste and appearance.

The nomadic tribes of Asia live almost exclusively on the flesh of sheep, and when a patriarch assembles his family to the one meal of the day, it is generally around a large tray containing a single sheep, which serves them for meat and bread. That country is the birthplace of the sheep, as it was for man, and nearly all domestic animals. It is the first animal that is spoken of in sacred writ as being kept by man, and Abel, the twin brother of Cain, found favor in the sight of God by offering up the firstlings of his flock, far above the fruits of the earth that were brought by his brother. It is often spoken of throughout the Scriptures, and was the favorite sacrifice to Deity, and has in all ages been esteemed the emblem of purity and innocence. Our Saviour is called the "Lamb of God," and the "Good Shepherd," giving a dignity to the position not vouchsafed to any other vocation.

Abraham, the father of the Jewish race, was a notable shepherd, as were all the patriarchs of those days, and Rachel, the beautiful daughter of Laban, and the mother of Joseph, thought it no degradation to attend to her father's flocks. Jacob, through a knowledge of physiology above his contemporaries, was able to carry off a large portion of the flocks of his father-in-law, and became a very wealthy shepherd. It was while tending the flocks of Jacob that

Joseph was stolen and sold to the Egyptians by his brethren. Job was also a great and rich man of those early times, being the owner of 14,000 sheep, besides other animals. This was, too, only about eight hundred years after the deluge, so that it is known that sheep were then, as now, very prolific, unless he owned all the sheep of the age. Moses, the great lawgiver, soldier, and prophet, did not disclaim to tend the flocks of Jethro in the desert of Midian, and still later the sweet singer of Israel, David, the greatest King of the Jews, kept his father's sheep.

It was to shepherds that the glad tidings of our Saviour's birth were first made known. While in the fields or range, at night, watching the sheep, the glorious company of angels appeared to them, striking their harps, and announcing to them the long looked for message of "Glad tidings of great joy," the Saviour is born unto the world. So profound was the joy, they left their flocks, and led by a star sent to them, were guided to the holy spot. Kings and princes prided themselves in the numbers and vastness of their flocks, and the shepherd kings of a later date attained great power. Among them Genghis Khan, Tamerlane, Kubler Khan, and others have attained an everlasting fame as great conquerors of the world.

We do not have to confine ourselves to the records of holy writ for examples of sheep husbandry. The profane authors, Homer, Horace, Virgil, Herodotus, Plato, and, in fact, all of the great writers of antiquity, speak in endearing terms of sheep. Some of the most delightful pastoral poems of Virgil picture the shepherd watching the sheep and delighting his love with the music of the reeds. The artists, too, have vied with one another in depicting upon the canvass agricultural scenes in which the never failing man sits with crook in hand and sheep around.

In the Middle Ages the improvement of sheep seems first to have been thought possible. The Asiatics raised them solely or nearly so for food, the warmth of the climate

making their wool a secondary consideration. When used by the ancients it was as often worn on the skin as otherwise, though there were exceptions to the rule. We all have read of the Syrian soldiers with their sheepskin coats, and the shoes of the more northern tribes were made of the skin with the wool turned in. Penelope kept her lovers at bay during the prolonged absence of her husband Ulysses by unraveling at night the woolen embroidery she had completed in the day, having promised her hand to one when she should finish it, and the language could not express the admiration of the poet at the many beautiful colors of her yarns. The reader is familiar with the loveliness and grandeur of the royal Tyrian purple that was imparted to the tunics which could only be transferred to woolen fabrics.

Spain and Portugal, however, are entitled to the credit of having made the first successful effort to improve the breeds of sheep with reference to the wool. Those countries are well and peculiarly adapted to the culture and raising of sheep. For the most part they are broken and mountainous, and abound with rich pasturage. The wealthy nobles of those feudal countries, too, derived a large portion of their income from the sales of sheep and wools. They did not condescend, however, to manufacture the wool into goods, but delegated that branch to Flanders, which was for many centuries connected, by royal marriages, to the same government. The merchants of the latter country were an industrious and enterprising people, and the lands not being sufficient to support its teeming population, they built many woolen mills, as well as other manufactories, and absorbed the wools of not only Spain, Portugal, and France, but absolutely bought up all the wool of England, made it into cloth, and then, returning it to where it was grown, sold it to the owners of the flocks at an enormous profit. These merchants made so much discrimination in the varieties of wool, the farmers began to try to improve the character of

the sheep. The celebrated Merino existed at that time in Spain, though the breed has been greatly improved since.

The portion of Spain resting on the Mediterranean Sea was inhabited by colonists, or rather the descendants of colonists from Greece. It is supposed that the expedition of the Argonauts, who were Greeks, to Colchis, in search of the Golden Fleece, was really an expedition in search of a breed of sheep whose wool was so excellent, and so highly prized, that it was termed the Golden Fleece. They returned with it, as is told by the poet, and thus Greece became the owner of the best sheep then known. When Spain was settled, it is natural to suppose they brought their flocks with them. At all events, it is certain that the breeds of sheep runniug on the slopes of the Pyrennees are identical with those of the Poloponessus. On the southern coast of Italy some of these sheep had in all probability been dropped by the Greek emigrants, and they had attained a great reputation in the times of Augustus. They were called Tarentine sheep, from Tarentum, the capital of Apulia, the province of Italy, where they were raised. Columella, a very rich Roman, emigrated to Spain in the year 30 A. D., and carried some of the Tarentine sheep with him, thus giving a cross to those already there. Some of the same breed were carried to Saxony, and by constant inbreeding they procured a wool of exceeding fine texture, but in other respects preserved the same distinguishing characteristics of the Merino. This breed differ in many respects from the common sheep. The wool is not long, but is closely curled, and matted with an exudation from the skin of the sheep called *yolk*, that closes it on the external surface, preserving it from trash and dirt. They will also retain the fleece for four or five years unshorn, while the common sheep will, if not sheared, shed the wool annually. The common sheep have little or no wool on the legs, belly, or head, but the Merino will carry a full fleece all over its surface. Let the Merino be carried to whatever

country it preserves all its distinguishing marks, provided it receives a sufficient amount of provision and attention. It also has a tenderness and juiciness far in advance of many others.

When the southern parts of Spain fell into the hands of the Moors, the change of masters was rather beneficial than otherwise to the immense flocks of sheep in that rich country, for the Moors were enterprising, and established many factories for the production of fine woolen fabrics, which they sold to surrounding nations. After their expulsion by Ferdinand and Isabella, the Spanish grandees sedulously preserved and zealously fostered the herds and factories, knowing the riches that followed the industry. So greatly were they appreciated that no sheep were allowed to be exported except by royal consent.

Henry VIII., however, obtained permission from Charles V. to carry some into England, and he succeeded in getting about three thousand into England, which, mixed with the common breeds already there in scant numbers, gave rise to the many excellent crosses now known as Leicester, Cotswold, Southdown, Rye-land, and some others. This sovereign gave great encouragement to sheep growing, throwing around it all the protection he could by law, preventing the exportation of wool, which had hitherto all found its way into Flanders for its manufactories. He so fostered it that by him and succeeding kings the sheep interest has increased from a few thousand long legged, ragged, coarse-wool sheep to over 60,000,000 at the present time.

As an evidence of the profitable character of sheep husbandry, it has been remarked that wherever a shepherd takes possession of a country with his flocks there they remain. When the Romans, under Coriolanus, and other leaders, conquered Spain, these fine breeds of sheep were all over the country, and Spain has ever since, until within a few years, maintained its pre-eminence as a sheep growing country, though, from political disturbances, and other ad-

ventitious circumstances, it has lost its position: but it yet retains much of its ancient fame as a sheep growing country. This fact should be borne in mind by the people of Tennessee in engaging in this important branch of husbandry.

While the mania for sheep growing and improvement of wool was at its height, more care was bestowed upon the animals than we can conceive possible in this age. The sheep were closely watched, and the choicest specimens were selected and housed. Sacks were sewn on their bodies. Besides, the fleeces were washed in wine, and frequently combed so as to secure the finest specimens of wool. This course, persevered in for several generations, produced its inevitable result. The fleece was greatly improved in texture, fineness, and softness, but it was done at the expense of the constitution of the sheep, which was greatly impaired thereby. They became less robust, smaller in size; but they little recked upon the carcass, which they only considered as a vehicle to carry the fleece. It is only in recent times that attention has been directed to an improvement of the body as well as the fleece, its popularity as an article of food having grown at a great rate for the last few centuries. It is only in thinly settled countries now that sheep are grown for the wool alone, its mutton being of as much or more consideration than wool in the thickly settled portions of the world. The choice of breeds becomes of more or less consequence according to the proximity or distance from the point of consumption, and, in fact, this has given rise to the creation of new varieties to suit the demand. So the necessities of sheep breeders have modified to a great extent the system of agriculture, so that, while the improvement in the character of the sheep has become well marked, the method of agriculture has kept pace, showing itself in the increased richness of the soil, and an increase of its productiveness. In this way profitable sheep husbandry is synonymous with profitable farming. But this improvement of the soil relates only to the mutton raisers. If the sheep are

reared only for wool, they have a wide range, scattering their odure over the hills, where it remains on the surface until washed off by rains.

The big, heavy mutton sheep, however, are fed in enclosures for the purpose of fattening, with rich food of grain, oil-cake, meats, roots, and luxurious pastures, and to procure these kinds of food the farmer is compelled to resort to the most approved system of tillage, using manures with a free hand, and this plan naturally gives life to the soil. Besides, the droppings of the sheep fed so freely are rich in nitrogenous substances, and being plowed under the soil, soon acquire a surprising degree of fertility. Thus, we say, good sheep raising makes good farms, and the husbandman makes his farm and himself rich.

The demand for mutton has already been noticed. It is steadily on the increase. Twenty per cent. more mutton has been consumed as an article of food in the United States since 1876, up to September, 1879, than for any years preceding. One city alone, New York, uses nearly a million and a half of sheep annually. Add this consumption to that of all the other populous cities of the United States, and we can form some idea of the vast number of sheep eaten as food every year. And now that the carriage of live animals to Europe has become a success, we may expect to see almost every steamship that goes over carry a large cargo of early lambs. Within the past three decades pork was the universal food of the country, lamb and beef coming in at rare intervals as a luxury. Now it is almost reversed, and the ordinary diet of the community, especially of all towns and cities, consists of beef and mutton. Owing to this cause the rearing of sheep for mutton alone is becoming more and more a prominent feature in agriculture.

We have no native mutton sheep in this country; in fact, the attention of the farming community has been directed to it for so short a time, new varieties have not yet been originated. The native sheep of the United States consist

of a mixture of all sorts and kinds, and they are constantly, for want of cultivated attention, deteriorating, being long legged, thin in the flank, suited rather to the fleetness necessary for protection than to the fatness suited for the table.

It is true, we have a considerable emulation among farmers of late years in the improvement of sheep, and the small farms throughout the State have one or more of fine sheep, such as the Cotswold, Merino, Southdown, or Leicester, but these are kept for breeding purposes alone, and rarely ever go to the table. For this reason we in Tennessee cannot expect to realize the highest prices, such as are paid to the breeders of Canada, where attention to the improvement of sheep began at an earlier period. Still, the Canada farmers cannot supply the great demand, and ours, though inferior, are taken perforce. If our farmers could once realize the high prices, from seven to ten dollars, paid for the full blooded mutton sheep, then certainly there would be given a very salutary influence to the business.

The demand does not extend alone to very heavy fat sheep. There are varieties of tastes, and to satisfy these different sheep are required. Some want the heavy leg, or shoulders, of the Cotswold, weighing from eighteen to twenty pounds, while others prefer the more delicate breeds, that do not grow half the size of the former. This fact is not generally known to farmers, consequently they cannot avail themselves of the advantages offered. In order to make it more profitable, farmers must study and understand the character of sheep needed, and the best methods of preparing them for the market, and then they may expect to derive full remuneration.

In order to do this the farmer must acquire a knowledge of the best breeds, the soil best adapted for their growth, the nature of the food best calculated to promote a quick growth, and the cheapest manner of producing that food. It is far better to thoroughly understand these matters than

to know the early history and origin of sheep. Sheep raising for mutton possesses one important advantage not pertaining to the grower of other kinds of meat. Besides affording the most healthful and delicious food, the covering of the sheep enters largely into the necessities of the world. When the citizens of the world clad themselves in the skins of animals, wool did not possess the value now attached to it. There are now about 30,000,000 of sheep in the United States, or, at least, there were at the last census. These produced about 100,000,000 pounds of wool; but so great is the demand for clothing that it required fully $40,000,000 worth of wool more than the home production, which had to be imported from other countries. Nor is this all. There are annually brought from Europe $20,000,000 worth of woolen goods, which represents that amount of labor that could be done here as well as abroad. So the necessity of increasing our wool growth is apparent to every one. If the growth of sheep was equal to our home consumption, we would reserve the large amount of $60,000,000 to be distributed among our own workmen. The increased number of sheep would consume a large surplus of our crops that now waste for want of a market, thus increasing the value of the crops that remain unconsumed. Still further. We have too many men engaged in agriculture. They are in too much competition with each other to make their work profitable. To make up this large amount of woolen goods would draw a great many persons from the farms to the factories, and thus the agricultural products would be increased in value, for the workmen would have to be fed as well as the sheep. Thus it is seen that all the laws of political economy demand an increase in the flocks of the country.

The next question that arises, is, can we profitably increase this business in Tennessee? This question is answered in the most eloquent manner by the vast pastures that annually throw up their rich carpet of herbage, and not being appro-

priated, it falls down and is lost to the world. Look at the fertile valleys of East Tennessee, where rich crops could be produced to feed enormous flocks that are or can be summered on the slopes of the surrounding mountains! See the vast plateau that spreads over the top of the Cumberland mountains, rich in all the native grasses, extending from Kentucky diagonally to Georgia and Alabama, fully fifty miles wide; then, on the foothills, and on the great rim of Middle Tennessee, that embraces nearly ten thousand square miles of Middle Tennessee. Go still further west, and large quantities of the West Tennessee plateau is in its primeval condition. The sound of the ax or the greeting of the house dog is almost unheard on the Cumberland plateau. But herbage, rich and succulent, is there, springing up but to wither away. All this and more. Not a single farm in the whole State, perhaps, is stocked with sheep to its full capacity. There are vast areas of rich pastures, and many tons of grain are produced and sold with great labor to the consumer, while it could find in the presence of flocks of sheep consumers that would pay far more for it than could be obtained at the "store." Here, upon these rich farms, the heavy mutton sheep, carrying its great hump of combing wool, could be most profitably raised. But it demands the most careful attention, and cannot be left to chance. It is far more profitable than cotton culture, and involves much less actual labor, though unremitting attention. What a vast field opens to the view in this State alone. How much actual wealth could be added to the commonwealth of Tennessee if every farmer would raise sheep no one can comprehend.

Still, as great as the breadth is, it must not be thought that all land is suited for sheep. Quite the reverse is true. Fortunately, the larger portion of our State will admit of sheep raising in the greatest perfection. Sheep naturally belong to mountains, and a broken surface seems to agree with them better than a level one. One thing they cannot

stand, and that is wet feet. They require a dry soil, and if it is not by nature sufficiently rolling to pass off the surplus water of the rainfalls, it must, to agree with them, be made so artificially. It would not pay to drain any large body of land for the sole purpose of raising sheep, and yet it will not pay to keep sheep on swampy lands. Hence the necessity of avoiding such. There is plenty of land naturally suited, having all the requirements necessary, and it is better to confine the business to such places.

Another thing. Do not expect to raise large sheep, or large fleeces, on poor pasturage, unless it is assisted by liberal feeding. The fleece on poor pastures will be coarse, scanty, and be disposed to shed. Another thing. Ewes will not bear twins on scant feed. If a flock is on a rich pasture the ewes will in a short time begin to double, and they will continue to do so as long as the food is generous. But change them to a poor scant pasturage and they will at once drop back to single lambs. Let it be understood, however, when the expression rich herbage is used, it is not meant that the heaviest, most luxuriant pastures are the best. On the contrary, sheep will do better on short, rich, close croped grass than on long grass. It must be rich, but at the same time it must be well cut or cropped.

The best lands for the business abound in our State. The soil over primitive rocks, such as granitoid, feldspathic, or micaceous, such as is found in upper East Tennessee, are well suited for the production of sheep. The sandstone soil of the Cumberland table-lands, being dry, and producing an abundant herbage, are admirably adapted for sheep walks. In fact, all the soils of the State, except such as are swampy, are well adapted to the business. But let it be considered beforehand thoroughly. Let there be no spasmodic effort to make a fortune in a few years. The profits come slowly but surely, and when one has once made up his mind to make it his life business, his fortune is already assured. With proper care and attention a flock will double itself

every three years, and, unlike many other branches of agriculture, it will pay expenses all the time of its growth. No chance must be trusted. If allowed, the dogs will destroy many, or the lambs will die in severe weather, or from being disowned by ewes, or many and various causes. All these things can be obviated by strict attention, and the object of these pages is to give such directions as will leave nothing to chance or luck. A judicious man will control his own luck.

That Tennessee is capable of producing as good sheep as any State in the Union will not be questioned, and with these preliminary remarks we will proceed with a short statistical chapter, showing the growth of the business in this and foreign countries.

CHAPTER II.

STATISTICAL INFORMATION.

Tennessee has labored under many disadvantages in regard to sheep raising, and consequently the actual capacity of the State has never been tested. In the first place, previous to the war between the States, the attention of farmers was directed mainly to horses and mules and to the crops from the soil, instead of to the production of sheep. The work was mainly done by negroes, a large number being owned in the State, and the cultivation of cotton, tobacco, hemp and corn mainly engaged the attention of farmers. But few saw proper even to raise enough wool to make the necessary clothing for the population, hence there was an actual falling off in sheep from 1850 to 1860.

What few did engage in the business became greatly discouraged by the inroads of dogs. Almost every family raised dogs; many of the well-to-do farmers owning packs of hounds, and no negro considered his outfit complete without one or more worthless curs. Being half fed in many instances, they naturally sought to provide for themselves, and the sheep being a remarkably timid animal, running from the sight of a dog, they fell an easy prey. Thus it was that the flocks of the few who did engage in sheep husbandry suffered so severely that many abandoned the business in sheer despair.

At the same time but little effort was made to utilize the immense natural pastures with which the State abounds. Men thought it too small a business to watch constantly the sheep as they roved through the highlands, and hence many sheep were totally lost by straying, were stolen or were destroyed by wolves, foxes, eagles and vultures. Although many of the same advantages presented

themselves then as now, sheep husbandry was not looked upon as a paying business, and so, by neglect, it did not thrive. Since the war, however, more attention has been given the subject, and Tennessee bids fair to become the great wool growing State of the Union. Situated in a temperate climate, neither too hot nor too cold, she possesses all the natural prerequisites for success, and no doubt will achieve great success in this branch of agriculture.

A notable instance of great success in this branch of stock raising is that of Mark R. Cockrill, Esq., of Davidson county. About half a century ago he began on a small scale the improvement of the native breeds. He imported Saxony and Merino sheep, crossed them with the ewes of the country, and sold both full blooded and graded animals. He sent his agent traveling through the country exchanging his sheep for the common breeds, as well as selling them for money. To accommodate his increasing flocks he bought the hill lands adjoining his farm, and clearing them up sowed down to blue grass. Being a shrewd business man the enterprise throve apace, and he soon had established a character for having the best sheep and the best breeds in the State. Nor was he content to excel in Tennessee, for when he had exhausted the premiums of his own country he sent fleeces to the great London World's Fair, and took the highest premiums there offered for wools. What Mr. Cockrill did then can be done now by any enterprising man who will give the business his whole attention.

THE FOLLOWING IS A LIST OF THE SHEEP RAISING COUNTRIES OF THE WORLD.

Countries.	No. of Sheep.	Pounds of Wool.
EUROPE.		
Great Britain	35,000,000	218,000,000
German Empire	29,000,000	125,000,000
Austria-Hungary	21,000,000	60,000,000
Russia	50,000,000	138,000,000
France	26,000,000	124,000,000
Spain	22,000,000	69,000,000
Portugal	2,750,000	16,000,000
Italy	11,000,000	38,000,000
Turkey	15,000,000	37,000,000
Greece	2,600,000	7,500,000
Switzerland	550,000	2,500,000
Denmark	1,900,000	8,000,000
Holland	900,000	4,500,000
Belgium	600,000	3,500,000
Sweden	1,700,000	6,000,000
Norway	1,750,000	6,250,000
	221,750,000	858,750,000
AMERICA.		
United States	36,000,000	185,000,000
Canada	2,000,000	8,000,000
South America and Mexico	58,000,000	174,000,000
	96,000,000	350,000,000
ASIA	175,000,000	45,000,000
AFRICA.		
Northern	20,000,000	51,000,000
Cape of Good Hope	12,000,000	
	32,000,000	96,000,000
Australia	60,000,000	255,000,000
Grand Total	584,750,000	1,926,750,000

The following description of the wool zone is taken from the United States Agricultural Report:

"South America, particularly Buenos Ayres, possesses great advantages for the cheap production of wool. Labor

is cheap and the population sparse. But the restless and predatory character of the population, and the unsettled nature of the government, constitute no inconsiderable drawbacks to this, as to every other branch of industry.

"Australia is another large sheep producing country, but it also has its drawbacks. Professor McCulloch states that the bad land in this country bears a much greater proportion to the good than in almost any other. It is also subject to long continuous droughts, often lasting six months. The effects of the drought in 1841 is thus described by Mr. Hood: 'It will scarcely be believed in England that the estimated number of sheep which have died within the last twelve months in the colony, from catarrh and drought, is 70,000; that colonists are compelled, in order to secure the dam from starvation, to cut the throat of her lamb; that no means are adopted for securing a stock of lambs for next year, or that a stockholder would give 8,000 sheep to any one that would remove them from his runs, and finding no one who would accept so dangerous a present, had recourse to consuming them by fire.'

"'The wild and poachy nature of a considerable portion of the pasture,' says Mr. Yonatt, 'gives the foot rot a peculiar character, and, if neglected, it becomes inveterate and destroys the animal. The scab is a prevalent disease, and the convict shepherd, who has a pique against his master, can easily, by bringing his flock in contact with a diseased one, subject them to this dangerous and troublesome malady.'

"'Epidemics, supposed to be owing to the astringency of the water, and some other causes, have, some years, cut off half the sheep.'

"The above extracts are from English writers of reputation.

"In considerable portions of Hungary the climate is fine, soil rich and labor cheap. Sheep raising on the large estates is very profitable, but she lacks facilities for cheap transportation. The Danube is her only natural outlet to

her commerce. To reach Trieste a long land carriage is indispensable. Her exports too are embarrassed by imposts and ruinous restrictions of the imperial government. She cannot therefore export cheap heavy articles to advantage.

"In Southern Russia, on the Steppes and in Bessarabia, sheep raising is carried on very extensively, some colonists owning flocks of 20,000 head. It is the opinion of the author that, taking into consideration the cost of land and labor, wool can be produced cheaper in Southwestern Russia than in Spain, France, Germany, Italy, or any other portion of Europe, excepting Hungary.

"Mexico is also a large wool producing country of a very inferior grade, classing with that of Buenos Ayres. A great deal finds its way to the United States through Texas.

"As has been remarked, the United States probably possesses half the cheap fertile lands included in the wool zone throughout the world. Nearly her entire territory lies within it. Experience has amply proved that sheep are healthy in every portion of the United States. The terrible drought and predisposition to certain diseases encountered by the Australian flock-master, the comparative insecurity of property in Buenos Ayres, the climatic vicissitudes of Southern Russia, (with the exception of the comparatively small peninsula of Tanrida), are none of them known in our most favored wool growing regions. Land is cheaper here and more fertile, and much nearer the great wool markets of the world than in Australia. Our lands are probably as cheap as those of Hungary and Southern Russia, and for a long series of years to come, will be practicably as cheap as those of Buenos Ayres, because the purchase of only a quarter section (80 acres) of government lands will give the possessor the use of all contiguous ones until they are occupied.

"Under all the above circumstances, we ought to compete successfully with South America, Hungary and Southern Russia in external markets, to undersell Australia in these markets, and with the discrimination of our tariff of duties

against them, to drive all foreign wools from our own markets."

Lest some may think that the business in time may be overdone, when it will be no longer profitable to grow wool, I subjoin a careful calculation copied from the Patent Office reports, showing the amount of wool which will be required to clothe the people of this country:

"The annual consumption of the entire population of the United States is estimated at six pounds per head; to place the estimates which follow certainly within the bounds of truth, we will assume the average at four pounds.

"By the first six censuses the increase of population was three per cent. per year, annually compounded would double it in twenty-three years and one hundred and sixty-four days. * * * Estimating the rate of increase from 1840 to 1890 at three per cent., which would double the population as above stated, and after 1890 at two per cent., which would double it in about twenty-six years, the following would be our population at the periods indicated, and the amount of wool which, according to the previous estimate, would be necessary for their consumption:

YEAR.	POPULATION.	POUNDS OF WOOL.
1863–4	34,136,906	136,555,624
1886–7	68,277,812	273,111,248
1925	136,555,624	546,222,496
1963	273,111,248	1,092,444,992

"Thus in one hundred and twelve years our population is likely to outnumber the present one of Europe, and our annual consumption of wool to exceed one billion and ninety-two millions of pounds. Assuming that sheep average two pounds of wool per head, it will require over 364,000,000 of sheep to supply the demand. The States south of the Potomac and Ohio, east of the Mississippi, containing 450,000 square miles, would support all there at a trifle over one and one-fourth sheep to the acre."

AMOUNT AND VALUE OF WOOLENS AND WOOL IMPORTED FROM FOREIGN COUNTRIES.

Years.	Woolens.	Wool.		
	Value.	Pounds.	Value.	Cents per pounds.
1861	$28,261,039	36,000,000	$ 4,961,326	13.7
1862	14,884,394	43,571,026	6,994,604	16.
1863	20,411,025	73,897,807	12,553,931	16.9
1864	32,139,336	90,396,104	15,923,991	17.6
1865	20,347,563	43,858,154	7,728,383	17.6
1866	57,115,901	67,917,031	9,381,083	13.8
1867	45,813,212	36,318,299	5,915,178	16.
1868	32,371,329	24,124,803	3,792,659	15.7
1869	34,560,324	39,275,926	5,600,958	14.2
1870	34,435,623	49,250,199	6,743,350	13.6
1871	43,751,973	68,058,028	9,780,443	14.3
1872	52,176,260	122,256,499	26,214,195	21.5
1873	50,875,805	85,496,049	20,433,938	23.9
1874	46,732,032	42,939,541	8,250,306	19.2
1875	44,440,940	54,903,654	11,069,901	20.1

FROM WHENCE IMPORTED.

Years.	Great Britain.	South Africa.	Australia.	Argentine Republic	Hungary.
	Pounds.	Pounds.	Pounds.	Pounds.	Pounds.
1862	16,006,963	3,920,257	783,670	5,786,868	14,061
1863	17,619,123	6,711,975	118,234	17,461,208	476,815
1864	13,099,501	13,717,900	864,548	23,951,506	3,490,800
1865	1,980,176	8,312,768	408,592	16,103,889	1,164,260
1866	8,541,195	7,424,217	874,119	36,916,794	2,224,629
1867	6,758,820	2,033,020	467,025	12,666,274	1,434,594
1868	2,581,678	964,314	.....	5,835,864	466,712
1869	8,598,299	2,644,504	....	8,249,659	932,369
1870	8,140,697	5,089,153	168,902	16,721,420	1,547,106
1871	15,593,166	6,699,057	19,957	23,333,237	4,594,238
1872	40,250,449	14,820,876	12,748,548	24,731,834	7,110,871
1873	19,040,920	12,830,858	7,661,262	17,449,563	6,110,911
1874	7,966,382	4,622,273	3,905,671	8,502,027	4,604,275

"The increase of the average price in recent years, as seen in the former table, is explained by the large proportion, as shown above, obtained from Great Britain and her colonies,

producing wool of better quality and higher price than that of South America.

"The average supply since 1870 may properly be placed at 224,000,000 pounds, of which two-thirds is home grown, but the nominal third of the foreign is mostly unwashed Merino and low grade carpet wool, constituting not more than one-fourth of the value of our wool supply.

"It is a suggestive and gratifying fact, that while the value of our manufactures is about four times as great as in 1850, the average of imports of woolens of the last five years ($23,797,698), exceeds but little that of the entire period of fifty-five years ($21,191,674), beginning with the very infancy of this benificent industry. It is particularly noteworthy that our imports since 1870 are less by several millions annually than for the period between 1850 and 1860, notwithstanding the immense increase in the consumption of woolen goods."

Having reviewed the rise and progress of sheep husbandry in other countries, and other portions of our own, we now come to our own highly favored State, Tennessee. The formidable array of figures against us may well make us stand aghast as in despair of our being able to contend in any appreciable degree against such fearful odds, but we shall endeavor to show that, though numbers will always be against us, there is no reason why we may not rise to a proportionate *value* of the grand total. Our favored geographical position and climate, and the changed character of the requirements of the trade, justify us in this assumption. In all the sheep producing countries of the world there are only four in which it is practicable to meet these requirements,—England, France, Germany and the United States. All others are debarred by climate or distance, or other causes, from entering into competition with them. This narrows the field wonderfully, and enables Tennessee to bear her proportion to other parts of the country in the enterprise. By these requirements of course we mean the raising of the

improved breeds of medium and long-wooled sheep for both wool and mutton. Happily, we are enabled to state that our farmers are already waking up to the importance of this, to them, new enterprise, and from the few successful experiments they have made, are encouraged to continue and to extend their operations. At the beginning of the year, we issued circulars to all the principal sheep raisers in the State, soliciting their view and experience upon the subject. Their answers have been most gratifying and satisfactory. They are not as full and complete as we could wish, but *one and all* agree upon the practicability and advantages of the change, and propose to increase the number of their flocks of improved breeds as fast as their means and opportunities will admit of. The results of these experiments are the more gratifying because there are no States south of Tennessee in which the long wooled mutton sheep can be raised advantageously. If there were, they would have no market for their surpus lambs and mutton. Tennessee has a good market for early spring lambs in St. Louis, Louisville and Cincinnati, and as soon as the Northern States begin to ship mutton to England as they are now doing beef, she will have a good market for all she can spare.

In 1875 the Commissioner of Agriculture of the State of Georgia issued a similar circular addressed to the farmers and sheep raisers of Georgia. From the answers received he arrives at the following conclusions, viz.: "That the cross of the Merino upon the native is the most profitable; that the other pure breeds (long wooled sheep) have proved to be unhealthy. Sheep are not housed in winter, but allowed to run at large during the whole year. The annual cost of keeping sheep is about fifty-three cents. Lambs sold to the butcher at $1.87, mutton sheep $2.75. Dogs very destructive. Census estimate of the number of sheep in 1870, 419,465; present estimate 319,323, a decrease from 1870 to 1875 of 100,142.'

The census returns of 1870 give the total number of

sheep in Tennessee, 826,783. The present estimated number is over 1,000,000. A new impetus has been given to the business within the past five or six years by the introduction of the improved breeds. The replies to our circulars show a growing interest among our farmers in regard to them. Their favorite breeds are the Southdowns and Cotswold; the first cross of either upon the native 'scrub' shows a marked improvement. The third cross, particularly with the Southdown, is scarcely distinguishable from the pure breed. The Southdown is regarded as rather the hardier sheep. Those situated convenient to railroads realize $4 to $4.50 for their spring lambs, and obtain from 40 to 70 cents for their wool when sent to the eastern markets. Common sheep average three pounds of wool, improved breeds six to eight pounds. They report no diseases among their improved breeds. They regard the climate favorable for them. No improved system of feeding has yet been generally adopted. The number of sheep kept by individual farmers range from fifty to five hundred head. Those who sell their sheep and mutton at home do not realize remunerative prices. Native sheep bring from $1.50 to $2 per head. Wool 20 to 25 cents, unwashed. Cost of raising wool ranges from 5 to 10 cents per pound, cost of keeping sheep 50 to 75 cents per annum. All complain bitterly of the repeal of the dog law, many proposing to engage in the business have abandoned the idea in consequence. Estimated loss by dogs from 3 to 10 per cent. See Appendix for more precise details as to sheep husbandry in each county.

NUMBER OF SHEEP IN TENNESSEE.

County.	No. in 1860.	No. in 1870.	County.	No. in 1860.	No. in 1870.
Anderson	6,919	6,064	Lawrence	5,744	5,520
Bedford	21,375	25,204	Lewis	2,587	1,676
Benton	6,617	7,790	Lincoln	19,534	27,075
Bledsoe	4,179	5,555	Macon	6,362	8,175
Blount	11,097	10,828	McMinn	8,999	3,558
Bradley	7,582	9,146	McNairy	8,870	5,605
Campbell	5,294	6,671	Madison	11,055	16,218
Cannon	8,506	12,198	Marion	3,437	21,330
Carroll	10,276	10,822	Marshall	14,521	9,829
Carter	4,110	5,430	Maury	21,181	9,865
Cheatham	4,367	4,825	Meigs	3,674	4,392
Claiborne	10,882	9,502	Monroe	10,371	8,346
Cocke	6,529	9,730	Montgomery	10,422	8,015
Coffee	7,125	8,107	Morgan	4 938	4,312
Cumberland	2,651	4,466	Obion	6,776	10,505
Davidson	15,940	12,221	Overton	11,833	17,293
Decatur	5,844	5,649	Perry	6,878	5,328
DeKalb	8,093	11,473	Polk	3,480	4,642
Dickson	9,282	6,925	Putnam	7,414	10,460
Dyer	6,735	8,831	Rhea	3,557	5,306
Fayette	11,269	3,828	Roane	12,290	10,552
Fentress	4,749	5,021	Robertson	11,737	11,146
Franklin	9,480	8,820	Rutherford	23,133	17,183
Gibson	16,822	14,113	Scott	4,772	6,589
Giles	15,684	18,658	Sevier	7,657	2,972
Grainger	6,991	9,797	Sequachie	1,774	9,578
Greene	18,826	21,130	Shelby	7,198	5,720
Grundy	2,021	1,880	Smith	13,555	17,591
Hamilton	5,127	6,741	Stewart	7,178	8,939
Hancock	5,254	7,365	Sullivan	14,735	15,634
Hardeman	7,604	7,139	Sumner	18,363	20,421
Hardin	7,867	8,044	Tipton	5,417	4,675
Hawkins	16,881	16,567	Union	5,382	6,326
Haywood	11,627	5,206	Van Buren	2,405	3,247
Henderson	9,203	10,168	Warren	10,702	12,495
Henry	13,824	10,878	Washington	12,342	13,208
Hickman	8,967	6,927	Wayne	.....	9,674
Humphreys	9,493	8,937	Weakley	10,742	13,034
Jackson	10,479	15,323	White	5,834	8,144
Jefferson	13,647	11,598	Williamson	19,142	15,226
Johnson	3,910	6,004	Wilson	21,045	24,023
Knox	10,329	13,441			
Lake	.....	816	Total	773,317	826,783
Lauderdale	2,757	3,118			

CHAPTER III.

THE ADAPTABILITY OF THE SOIL OF TENNESSEE TO SHEEP HUSBANDRY.

Probably no section of the American Union presents so many advantages for the successful raising of sheep as that wide stretch of country embraced between the Alleghany mountains on the east and the Mississippi river on the west, and extending from the thirty-fourth to the forty-second parallels of latitude. This includes the very heart of the Mississippi Valley, and its diversification of surface, great variety of soils, and genial climate ensure the successful growth of all the more nutritious grasses. Within this area the cold is not so severe during winter as to make the care of sheep a source of great concern; nor are the heats of summer so extreme as to produce, after a few generations, a degeneracy of the character of the fleece. It is well known to naturalists that within the limits of hot climates the wool often disappears from the whole body of the sheep and is replaced by a hairy coating. According to some scientists this is a case of unequal development, the hair growing more rapidly than the wool, and crowding it out; or it may be that nature, disdaining to work for no effect, supplies the cooler coating of hair for the warmer one of wool. In the heated valleys of the Codilleras, according to the authority of Roulin, if the lambs are sheared as soon as the wool has grown to a certain thickness, all goes on afterwards as usual, but if not sheared a short shining hair like that of the goat is produced ever afterward.

Tennessee may be called the center of this vast sheep producing area, and it certainly presents in its variety of soils, surface configuration, and climatic elements, all the combined advantages of the States surrounding it. This is

made apparent by a cursory examination of the different natural divisions. The climate embraced within its limits is peculiar in the fact that it is very greatly modified by reason of the existence of mountain heights, rolling plains, level surfaces, by water courses, trend of mountain ranges, and great forests. The mountains which bound it on the east rise in massive proportions from 3,000 to 6,500 feet above the surface of tide water, and the average annual temperature does not exceed fifty-four degrees. These mountains are usually steep, but not rugged, and where the metamorphic soils prevail they are beautifully rounded, and their sides are clothed with gigantic trees, suggestive of the fertility of the soils. On the tops or crests of these mountains treeless spots often occur, but the surface in such places is matted with everlasting grasses of great variety, succulence, and nutrition. I have seen timothy (*Phleum pratense*), herd's-grass (*Agrostis vulgaris*), blue grass (*Poa pratensis*), goose grass (*Poa annua*), meadow fescue or evergreen (*Festuca pratensis*), white clover (*Trifolium repens*), and many others growing side by side, and forming a turf unsurpassed in the richest basin soils of Tennessee or Kentucky. These grasses form a regular succession, and supply grazing throughout the summer months. And by reason of the frequent rains during the growing seasons, they furnish far more grazing than they would in the valley lands, where summer showers are more unfrequent. I estimate that two acres on the mountain top will supply as much grazing as three in the valleys. It must be remembered that the warm south winds, freighted with moisture from the Gulf of Mexico, which blow almost constantly during the summer months, are arrested in their northern course up the valley of East Tennessee by their mountain barriers, and the water is squeezed from them by the rapid diminution in their temperature when they strike the cool surface of the mountain tops. Scarcely a day passes in summer without a shower. Many of the spurs of these

mountains are of sandstone origin. Such spurs are very barren. No nutritious grasses grow on them, only greenish running briers, lichens, mosses and ferns. It might be supposed that these frequent rains would give a humidity to this region too great for the health of sheep. This is only true within limits. Where the soil is retentive of moisture, such as the boggy places, sheep will not thrive, but by far the greater portion of the soil drains rapidly, and after each shower the sun comes out with a singular brightness, and dissipates the moisture, besides, evaporation at these great heights goes on with more rapidity than in the valleys below. The eastern, southern, and western slopes of these mountains are well adapted to sheep husbandry, but the northern slopes are so thickly covered with mosses and ferns, forming a mass often one to two feet deep, that all grasses are rooted out, and the moisture is constantly held by the thick mats.

These cleared slopes in south-western Virginia are the very best grazing grounds in that State, and in these counties in Tennessee, notably Johnson and Carter, where the rich mountain sides have been denuded of timber, sheep husbandry is accounted very profitable. The wool, too, is of singular excellence, and brings in the market several cents more per pound than the valley-grown wool.

After a patient investigation of the subject I cannot subscribe to the doctrine laid down by Mr. Henry Stewart, in his work entitled "The Shepherd's Manual"—a work of singular excellence and merit, and to which I am much indebted—that sheep do not thrive well on metamorphic soils. This may be true of the latitude of New England and old England, but in the latitude of Tennessee, North Carolina, and Virginia, sheep upon those soils are fruitful and healthy, long livers, and abundant bearers of wool. Other causes must be assigned for their unhealthiness than the metamorphic origin of the soils, for it is not universally true, and as far as Virginia, North Carolina, and Tennessee

are concerned, not true at all. In my opinion, no better spot could be selected for a sheep farm than the slopes of the Alleghany mountains. They are well drained, they are fertile, they abound in native grasses, they are convenient to market, they supply a safe refuge from the heats of summer and from the chilling blasts of winter, and from the vexatious annoyance of flies. But I would not advise the growing of heavy sheep except on the level plateaus. The hardy Merino, the nimble and fleet footed Cheviot, would find on the sunny slopes of these mountains a home far more congenial than upon the Pyrenees of Spain or the Grampian hills of Scotland. The natives found on these mountain heights are as fleet as the deer and as healthy. The wool is very white, soft as fur, firm, lustrous, true, and the sheep show a beautiful adaptation to the locality which they occupy. These natives, crossed with Merino or Cheviot, would give the very best sheep for the mountains. The words of Darwin on this subject are full of wisdom for the enlightened flock-master. He says:

"The most common and profitable use of crossing has been to improve common breeds of animals, or rather to transform them into the improved breeds. This has become so common in all parts of the country, that it is not necessary to dwell upon it; it is never amiss, however, to remind farmers that improved animals always need improved care and feed. Five or six crosses, with careful selection, will transform almost any scrub animals into thoroughbreds, or into animals that cannot be distinguished from thoroughbreds, and which, for all practical purposes, are equal to them. It would, then, require but a few years of united endeavor to cause the scrub animals to disappear from every part of our country, and animals as good as our best thoroughbreds to take their place, were it not for the increased requirements of such animals, and the apparent impossibility of so suddenly modifying our agriculture as to provide the necessary conditions for their existence."

The native sheep of every country are a correct expression of what the food and climate of that country will produce. Their constitutions are moulded to suit their environments. Crossed upon improved breeds the hardiness of constitution is united to the desirable qualities of thoroughbreds. In any attempt, therefore, at sheep raising in these mountains this idea should not be lost sight of, and the very best foundation for a flock is the native ewes, crossed on some of the improved breeds.

The valley of East Tennessee consists of a great wide trough, bounded by parallel mountain sides, that on the east being the great Unaka mountains, those on the west making up the eastern escarpment of the mountainous coal field of Tennessee. This included trough or valley trends obliquely northeast and southwest, which is the general direction of the great Appalachian chain, and of the Atlantic coast. Measured on the northern boundary of the State, and obliquely to its course, this trough is one hundred miles wide, and in the southern fifty miles, and is one hundred and eighty miles long. One of the remarkable peculiarities of this valley is that its surface is longitudinally fluted by parallel minor valleys and ridges. In this it differs from all other parts of the State. This feature gives a certain direction to its rivers, and more especially to its smaller streams. This trough or great valley is, in the main, the agricultural region of East Tennessee. The principal stream is the Tennessee, the tributaries of which, on the east, are the Watauga, the French Broad, the Little Tennessee and the Hiwassee; on the west the Clinch and the Sequatchie. This valley has a climate more equable and pleasant than that of any other part of North America east of the Rocky mountains. It lies between parallels 35° and 36°4′ north, and its mean altitude is one thousand feet above the sea level. The prevailing winds are from the southwest and west, and they bring a constant and bountiful supply of rain from the Gulf of Mexico.

Knoxville is the geographical center of East Tennessee, and it occupies a mean elevation too, so that it may be taken as the climatic center also.

The summer mean at Knoxville, 73°6′, is about that of Philadelphia, Pennsylvania, as well as that of several points in central Virginia, of Cincinnati, Louisville, Kentucky, southern Indiana, and central Illinois. It is that of the central part of Spain, and the northern part of Italy. The summer of the East Tennessee Valley is, therefore, considering its valley-like character and its low latitude, a comparatively cool one. This is mostly due to the considerable elevation of the region above the sea.

According to very careful observations made at the Tennessee University, under the direction of the United States signal service, at Knoxville,

The mean temperature for the year is	57°
The mean heat for the summer is	74°
The mean cold for the winter is	40°
Average maximum temperature	91°
Average minimum	2°

The result is a mild and equable climate, that combines delightfully the temperate and tropical, without the extremes of either.

The mountains on either side protect the valley from the blighting and chilling northern and northwestern winds that so scourge the plains of the northwest, while they act as a natural conduit for the milder and gentler winds that come from the Gulf of Mexico. But even these are tempered into pleasant breezes by the spurs or cross sections of mountains which break out from the main ranges. Thus it comes, that while it is a very rare occurrence to see the anemometer standing still, destructive storms are never experienced. A happy result of these influences is a degree of exemption from all malarial and atmospheric diseases, unsurprssed in any country. The undulating surface of the land, the great numbers and rapid flow of the rivers, the

entire absence of all low and marshy lands, and the constant flow of gentle breezes, keep the atmosphere pure and exhilarating to a delightful degree.

The rich, undulating surface of this great valley, its admirable drainage, its suitableness for a mixed husbandry, and its great healthfulness, have made it a very populous region, while the grandeur and picturesqueness of the landscape have entitled it to be called the Switzerland of America. Within recent years it has won an enviable character for the excellence of its stock, and especially for sheep. Two of the most splendid fleeces exhibited at the recent Paris Exhibition were sent from East Tennessee, one grown by Col. Tom Crutchfield, near Chattanooga, and the other by Mr. H. H. Matlock, of McMinn county. For length and lustre, and uniformity of fibre, these fleeces bore off a prize medal, and this, two, without having any one to exhibit them, or any particular attention directed to them.

Nearly every farmer in this valley has a few sheep, some of them splendid flocks, and no complaint has ever reached me of unhealthiness where the flock was built upon the native ewes. (See Mr. Crutchfield's letter in Appendix.)

The Cumberland Table-land is two thousand feet above tide-water, with a dry sandstone soil, and an exceedingly cool and pleasant climate in summer, the mean temperature being about 71°. The air is dry and bracing. During the summer months the surface of the earth is covered with tussocks of fine, nutritious mountain grasses, and furnish ample sustenance for sheep eight months in the year. In addition to the wild grasses, herd's-grass, clover, and orchard grass, with slight attention to manuring, will grow well. Wild peas also furnish a nutritious herbage. The soil can easily be made to yield sufficient supplies for winter feeding by sowing it in stock peas, a food not only healthful for sheep, but highly relished by cattle.

To be successful in sheep raising on this Table-land, the

breeder must be careful to build shelters for protecting his flocks from the middle of November until the middle of March. The climate is very rigorous in winter, and the keen northern and northwestern blasts will speedily impair the health of the improved and tender breeds. The native sheep are very healthy, and rarely suffer from any disease, though they are not profitable, the wool being coarse and short, and the carcass light and lean. This arises, however, more from neglect than from any local cause. It should never be forgotten that thrifty flocks may be raised wherever industrious men and good breeders live, and that the best flocks will degenerate where inattention and neglect are practiced.

The advantages offered by this mountain region for the economical rearing of sheep are:

1. The cheapness of the lands. Lands may be bought at almost a nominal price on the Cumberland mountains. Though high and healthy, the soil in comparison with that of the valleys is poor and unproductive. The price for wild, highway-pasture land varies from fifty cents to three dollars per acre, depending mainly upon nearness to railroads and markets. Care should be taken, though, to investigate the titles thoroughly, for one of the most unwise acts of our past legislation was the opening of a land office, and allowing every one to make his own surveys, and receive a grant for lands based upon such surveys. Oftentimes it happened that the same land had been entered in whole or in part by others. The possession of a land grant does not carry with it in this State a title, but the title rests with the oldest grant, assuming it to have been regularly entered at first. Let strangers beware of purchasing mountain lands without a rigid investigation of title. I am led to make these remarks because complaints have reached this office that persons have been swindled in purchasing land grants. There is no difficulty about securing good titles to valley lands, but there is danger that a person may buy

land upon the mountain with a grant from the State, bearing the great seal of authority, and have no title.

2. The second advantage these mountain lands offer for sheep raising is in the wide range of pasturage. The open woods permit the luxuriant growth of nutritious herbs and grasses throughout the summer, and will subsist millions of sheep for eight months in the year without any other care than salting.

3. A third advantage may be found in the dryness of the sandstone soil, which insures exemption from many of the diseases fatal to sheep. No foot ail, no braxy, no impaired organs of digestion, no blind staggers, and, indeed, no other disease than old age, or starvation through want of care, has ever attacked them. No do flies annoy or vex flocks as they do in the lower plains.

There are also some disadvantages attending raising sheep upon this mountain. The pasturage is so extensive that they often stray off and are lost. There is, also, the calycanthus, that on some of the slopes grows vigorously, bearing seed, readily eaten by sheep in winter, and which is a deadly poison. To guard against this, sheep should be driven up and fed before the rigor of winter and the scarcity of grass compel them to devour such food. Another drawback will be found in the distance from market. While the wool may be easily conveyed to shipping points at a small cost, mutton sheep would suffer much in flesh by being driven long distances. Of all this region, embracing more than 3,000,000 acres, less than 500,000 acres are within easy reach of railroads or navigable streams.

Several experiments on a large scale have been made on this Table-land in sheep growing, but most of them have failed because sufficient attention was not given to providing provender for winter. And yet there is no good reason why this should be so. It is true that corn will not, as a general thing, except, probably, in Scott and Morgan counties, repay the cost of cultivation, but there are other crops that

will make a satisfactory yield. It has already been mentioned that one of the best that can be grown by the sheep husbandman is the pea. Fodder enough could be readily made from the haulm of the pea to keep large flocks through the winter. Turnips also grow well upon the mountain, and in some sections oats and rye yield well. Besides these, corn-fodder could be raised in any desirable quantities, and sorghum. The fatal impression with most of those who have attempted to raise sheep on the mountain has been that sheep could subsist through the winter without feeding. Practising such a belief three-fourths of those who have tried sheep raising on the mountain have ignominiously failed, and it is retributive justice that they did. There ought to be no success without watchful care. The raising of sheep successfully in large flocks cannot be an *avocation;* it must be a *vocation,* demanding the time, care and patient attention required in other pursuits.

My own impression is that the Merino sheep, if properly cared for, would prove a profitable investment on these mountain lands. One precaution would be necessary, and that is to keep the bucks from the ewes until about the middle of November, so that the lambs would come after the rigorous winter weather is over.

On the rim-lands surrounding the Basin the soils generally are more fruitful of the domesticated grasses, and in certain localities, particularly in Dickson, Humphreys, Lewis, Hickman, and Lawrence, the wild grasses grow quite as well as upon the Cumberland Table-land. The surface is generally very level (except where cut by stream beds), where the wild grasses flourish most abundantly, and the woods are open. Many parts of the Highlands are very fertile, as is Warren, Franklin, Stewart, Montgomery, Robertson, Clay, and considerable areas in Putnam, Overton, Coffee, Houston, and Lawrence. Humphreys, Dickson, and Hickman have also many fertile areas. Sheep are very healthy on these uplands, and require less care in winter

than they do in a mountainous region. The outcrops of limestone along the streams, forming high bluffs, furnish excellent retreats from the wintry blasts, and in such situations tufts of grass often keep green throughout the winter, and enable sheep to procure a ready subsistence. This highland district also furnishes some of the best wheat lands in the State. By sowing early, and allowing the wheat to get a good growth in the fall, it is found equal to sustaining a great many sheep during the winter. Rye and barley are often sown also for winter pasturage.

A practice that ought to be more generally adopted, is to sow herd's-grass, and let it grow during summer, leaving it uncut. The dried grass will protect from frost and freezes the new grass which springs up in the warm days of autumn, and this will supply good winter grazing for sheep. Unlike timothy or orchard grass, herd's-grass will bear without damage the close cropping of sheep. This grass is probably for all purposes, grazing and mowing, the best that can be sown upon the thin lands of this division. It is very hardy, bears grazing well, makes good, though light hay, and will survive the worst treatment. Its greatest enemy is the broom-grass (*Andropogin scoparius and A. furcatus*). Orchard grass grows well also on these highlands, and for summer grazing is greatly superior to herd's-grass. Blue grass, except in some favored localities, does not make a good or lasting sod on the highlands.

In many parts of Warren county the Japan clover (*Lespideza striata*) has taken possession of all uncultivated places, and has proved a most formidable enemy to the broom-grass, the villainous pest of all meadows. This clover is highly relished by sheep, and though short, it furnishes a good pasture from May until frost.

All along the Tennessee river, in its western passage through the State, are wild lands now heavily clothed with valuable timber, that could be made splendid sheep walks. These lands are well drained, generally rolling and elevated,

and well adapted to the growth of many varieties of grasses. They are almost as cheap as the mountain lands, and far better in the qualities of the soil.

But by far the best locality in the State for raising all classes and varieties of sheep is the great silurian, limestone basin of Middle Tennessee. Here the meadows are luxuriant, the pastures are green, the soil is fertile, the water abundant. Here are landscapes diversified by hill and dale, wood and stream, meadow and field, forming a thousand delightful combinations, and making an extended panorama of exquisite rural elegance and beauty. Here all the grasses flourish, even the loftiest hills are set in blue grass, and countless flocks fleck the landscape on every side. The highest evidence that can be adduced as to the value of this basin for sheep raising lies in the fact that sheep are grown upon nearly every farm, and up to a certain number are universally held to be profitable. Every breed has found admirers, and every breed does well. Sheep require no feeding in this division during winter, when upon good grass, barley, wheat, or rye fields, except when there is a fall of snow. Then some oats, fodder, or corn are fed. They are very healthy, and, indeed, when attended to, prove a most profitable investment up to a certain number, say one sheep for every five acres of open land, or two sheep on every acre of permanent pasture, presuming that the farmer will have other stock in proportion to the size of his farm.

The cost of keeping sheep per annum per head is about one dollar and twenty-five cents. The wool of one sheep of high grade will pay for the keeping of two. Lambs are clear profit, and the estimated cost of wool, dividing the cost proportionately between it and lambs, is below ten cents per pound. The average yield of wool for improved breeds in this basin is between seven and eight pounds—natives from two to four pounds. Nearly all natives have disappeared from this locality, and high grades have taken

their place. Mutton sheep, near Nashville, good grades, bring in the market five cents per pound, gross; lambs, grade, three and a half to four and a half dollars.

A large trade in lambs has been built up within a few years past. Hundreds of car loads are shipped every spring from this basin to points North, and good prices realized. Good sheep farms can be bought in the basin for ten to forty dollars per acre—the price varying as to situation and soil.

We come now to consider the Plateau Slope of West Tennessee for the breeding of sheep. Here the lands, except a strip near the Tennessee river, are low, the surface generally broken by gentle undulations, except in the river basins. The counties bordering the Tennessee river are occasionally rugged, especially the western parts of Hardin, Decatur and Benton. The soil of West Tennessee being largely intermixed with sand, grasses do not grow so universally as in the last division spoken of. Nevertheless, some grasses find here a most congenial soil. In no part of the State does herd's-grass grow so luxuriantly, nor has the soil any superior for the production of orchard grass. In that tier of counties running next to the Kentucky line, and parallel with it, also in Dyer, Lauderdale, and Tipton counties, where the Bluff Loam formation prevails, clover attains its highest development. Nowhere, however, in West Tennessee, does blue grass make a first-rate sod. It will grow, but not better than upon the rim-lands. As a division, however, West Tennessee has a larger proportion of rich soils than either Middle or East Tennessee.

Sheep husbandry has never claimed the attention of the farmers in this division to the extent its importance merits. In many counties there is not wool enough grown to furnish stockings to the inhabitants. For producing heavy mutton sheep there is no part of the State better adapted. The numerous railroads give easy access to markets, and good prices could be realized for early lambs and fat mutton

sheep. It is a fact well known, that, owing to the milder climate of West Tennessee, the lambs of January are as healthful and hardy as the February lambs in the Central Basin. This is a great advantage, giving the benefit of bare markets to the West Tennessee breeder. If more attention were given to sheep raising in that division and less to cotton growing, great improvement would soon be visible, not only in the general management and productiveness of the farms, but in the financial status of the farmers themselves. There is nothing for which there is so constant a demand as fat lambs and good mutton. Wool, which can be produced at about the same cost as cotton, is always of ready sale. A diversified agriculture is greatly needed in West Tennessee, and there is no branch of farming more interesting and more remunerative than the breeding of sheep. With the lands in West Tennesese carrying a fair number of sheep, there would be in the aggregate an immense addition to the income of the farmers, and thrift, plenty and contentment would take the place of doubt, fear, and disappointment. Decatur, Hardin, Benton, McNairy, and Hardeman, by reason of their rolling surfaces, seem especially suited for sheep raising, while many other counties richer in soils, and, therefore, better suited for general cropping, are really inferior for this branch of the farmer's calling.

Having passed rapidly over the State, and noted the peculiarities of each division, it will readily appear that its diversified surface offers unsurpassed advantages for growing all the different varieties of sheep that are profitable in this latitude. In order to secure the greatest profits the breeder should first consider the variety best adapted to his locality, and the proximity of a market for his mutton. In the broken, hilly region of East Tennessee, an active, hardy sheep, a good feeder, with a medium coat of wool, will be found most profitable. To build up a breed of this kind, presuming we start from the native mountain scrub, the

most desirable cross to make first is the Merino. This will give hardiness and longevity. Add two or more crosses of Cotswold or Leicester, and we get size and fleece. Many farmers are apt to use the Cotswold or Leicester blood too freely after noting the good results of the first cross, thereby increasing the weight of the fleece at the expense of the other desirable qualities of his flock. As we approach the lowlands in the valley of East Tennessee, where the grasses grow more luxuriantly, the fleece should be increased by using more extensively long-wooled bucks. A cross with some of the heavier breeds of the Down can also be made with good results—such as the Shropshire, Hampshire, and Oxfordshire downs. In breeding these, however, it is important to look out for a close market for lambs, as it is for their weight as mutton that these heavy breeds are considered most valuable. When mutton becomes the principal object of the flock-master, we would give the Southdown preference over all others. An excellent and very profitable mutton-and-wool sheep can be grown in the level section above referred to, by crossing the Southdown upon Cotswold grades, bred as those first spoken of, viz.: with a Merino foundation, and crossed up with some of the long-wooled families. In fact, there are but few of the different varieties but would be improved to some extent by an infusion of Merino blood, especially when it is the intention of the breeder to make sheep husbandry a specialty, and raise large flocks. In the middle portion of the State all varieties can be grown with great success, and here the breeder has only to consider the principal object for which he wishes to build up his flock. If for wool, the nearer he approaches the thoroughbred Cotswold the heavier will be the fleece, but if mutton is his object the Southdown blood should predominate. On leaving the Central Basin of the State, going west, the long-wool sheep should be gradually discarded, to give place for a variety better suited to the climate and the grazing facilities of the country. Here we

would again place the valuable Merino blood as a foundation, and cross it up with Southdown. This will make a most profitable breed for the farmer, giving him a hardy, quick-maturing mutton sheep, with a sufficient fleece to pay him handsomely on his investment.

To sum up the whole, in order to get the best breeds for the different sections of the State, we will only select three of the principal varieties having in a greater measure than any others, the most desirable qualities sought after by the breeder, viz.: hardiness, fleece, and mutton. For the first we would select the Merino, for the second the Cotswold, the best known and most generally used of all the long-wooled breeds in the State, and for mutton the Southdown. For the eastern division of the State the Cotswold and Merino cross, for the middle division the Cotswold and Southdown, and for West Tennessee the Merino and Southdown.

Farmers, as a rule, should not go into sheep husbandry to the neglect of other things. Let sheep be *one* of the products of the farm, not the *only* product. A few sheep well cared for will prove profitable to every farmer, while a large flock would become, in nine cases out of ten, a source of annoyance and expense. The object of this paper is to show the profitableness of sheep raising on a small scale. I do not advise the keeping of large flocks by the generality of farmers. If every farmer should carry a small flock, breeding up the natives to high grades, the profits would be very much increased.

There is still another question which the Tennessee farmer should look to—the question whether to make the growing of wool the principal or subordinate object. This will be governed entirely by his location. If he occupies the high-priced, fertile soils, that abound in many parts of the State, then by all means the production of meat should be his principal aim, and wool only occupy a secondary consideration. Sheep that will mature early, fatten quickly, trans-

forming the rich, blue grass and grain into luscious mutton in the shortest possible time, are those which will yield the greatest profit. Long-lived animals in such localities are by no means so important as when wool is the primary object. The conditions are reversed upon the thin soils, and in the sparsely populated portions of the State. There wool should be the principal end, and mutton the incidental, for it would be quite possible to keep a flock of a thousand or more on a widely extended natural pasture, at less cost of time, trouble, and money, than a flock of one hundred on a small, but very fertile and highly improved farm. To market mutton from long distances entails loss, both in quality and quantity; but no product of the farm, in proportion to value, involves so little expense in transportation as wool. The flockmasters' motto should be mutton for the rich valley lands; wool for the mountain districts and thin table-lands.

CHAPTER IV.

EWES AND LAMBS.

In the establishment of a sheep farm the main consideration with the farmer should be, not to obtain the greatest number of sheep most rapidly, but to so manage the flock as to make them the most valuable for the purpose he has in view, be his object wool or mutton or both, or for breeding early lambs for market, and in doing this the husbandman must pursue that plan most likely to increase the size of the carcass, and to improve the quality and quantity of wool. In making the necessary calculations, the manner of selling must must be taken into consideration. A farmer remote from any market for early lambs will have to devote thought to the wool, as that is more easily carried to market, but if he is conveniently located, his chief source of profit will be to produce early and many lambs. This idea determines the breed of sheep to be kept, and, in starting the flock, this should be borne prominently in mind. But in either case much and continued care must be bestowed upon the ewes and lambs, as without proper attention to them the flock will, by various vicissitudes, become rapidly lessened.

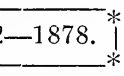
A ewe bred to a buck will go five months, or more accurately one hundred and fifty-two days. With this knowledge the farmer can so time the coming of the lambs that they will drop at any time desirable. In Tennessee the lambs begin usually to come about the 1st of January. But this is a bad time for them to fall, unless breeders are making a specialty of breeding lambs for early spring market, in which event they must have suitable arrangements made for giving them extra care and attention. At that time we generally have very inclement weather, and it necessarily involves the loss of many lambs. The custom of allowing the

ewes and bucks to run together all the year is universal in this State, and as long as that custom is persisted in, there is no way to prevent it. But if the farmer wishes to become a successful sheep raiser he ought to pay attention to all the minute details of the business. A very necessary one is to separate the rams from the ewes at shearing time and keep them apart until it is desired the ewes should be bred. A flock of forty or fifty ewes requires only one buck when he is properly used. A want of attention to this item involves a loss of lambs by barren ewes. Merino ewes will begin to breed at two years of age, but all other breeds will go the first fall, though young ewes will not breed as certainly as those two or more years old.

A young buck is not a sure breeder. An aged ram is much to be preferred. A ram in his second year may be used to serve only a few ewes if he is very vigorous, for the size and strength of a lamb depends on the size, strength and age of the sire, as well as upon the condition of its dam. A ram at three or four years old is at his prime; from this age all rams begin to get uncertain as breeders. Especially is this the case when they have been allowed to run with the flock.

Fine blooded ewes should be kept away from the ram until the second year, as earlier breeding materially interferes with the improvement and growth of their progeny, as well as stunts the ewes.

If there is only a small flock of ewes kept on a place for the purpose of raising fine breeds, it will be found very convenient, yes indispensable, to mark them in such a way as to distinguish them afterwards. The following is a good way to mark them:



The first figures relates to the number of the sheep, the second relates to the year dropped. This band is inserted

in two holes cut in the ear, pushed by each end and then bent inwards so that it will hold. The ear will soon heal around it like the holes in a lady's ear, and it will remain for life. The mark should be put in up and down on the ewe and across the ear in a buck, so that there will be no trouble in distinguishing the sex. It will be a most convenient thing also to have a memorandum book, such as suggested by Mr. Stewart in his work, to tally with the ear marks kept in the following manner. Let it be ruled into columns, and entries made accordingly, as per example:

Breed.	Age.	No. of ewe.	No. of ram.	When dropped.	When served.	Will lamb.	Lamb'd	Remarks.
Cotswold.	2 years.	26	2	Feb. 1, 1877.	Sept. 1, 1879.	Feb. 1.	Feb. 2.	Twins.

No one can properly appreciate the convenience of such a book as this until it is tried. By reference to it anything can be known that is wished about the ewes and rams, and an exhibition of this book will convince the purchaser of the accuracy of any statement made in reference to each sheep of the flock. Under the head of "Remarks," any fact in regard to the ewe or ram can be noted, whether she is a good nurse or breeder, or whether the lambs are strong or weak. This book will also enable the farmer to eliminate from his flock all such as are not good breeders, or if he wishes he can set aside all ewes that bear single lambs. It will also enable him to fatten such ewes as are becoming too old for the butchers, thus keeping up his flock to the highest standard of excellence.

The best time for lambs to drop in Tennessee is from the 20th of January to the 1st of March. About the 15th or 20th of January we almost invariably have a good warm spell of weather, which usually lasts, with but a few days of cold, until spring opens. If, however, the farmer is near

a market sufficiently large to make the breeding of early lambs profitable, he, of course, will be prepared to care for them at any time they may come, even in mid-winter, and the earlier he gets them the larger his profits will be, if they are well fed and cared for, when brought to the butcher. Many farmers in the middle portion of the State are making a specialty of this business, and are breeding their lambs for December. The breeder always realizes a fancy price for the first "spring lambs," often as high as five dollars for fifty pound lambs.

It should be borne in mind that but few farmers are either suitably located or prepared to give the attention necessary to this particular branch of husbandry, and to those who are not, it would be injudicious to attempt it; but with the farmer whose lambs begin to come in the latter part of January and February, if he will watch closely on cold or rainy days he can almost invariably save all lambs that come at this period. In order to bring them early the rams must be turned to the ewes about the 20th of August. It is much better that the ewes should be served only once by the ram, as oftener will frequently result in abortion.

As mentioned above, it is both injudicious and expensive to allow a ram to run with the ewes, especially at this season. A good plan, and one that will preserve the vigor of the ram, and enable him to serve the greatest number of ewes, is to have him in a lot to himself, and in the evening, late, turn in to him six or eight or ten ewes, first having painted his belly with red paint. In the morning every ewe he has served will be marked with red. The entire batch should be turned out from him during the day, thus allowing him to recuperate for another lot that will be turned in to him in the evening. In this way he will rarely ever serve the same ewe twice, and the breeder, by noting in his book, as mentioned above, the date of service, will know exactly what time to expect the lamb, and can give those particular ewes extra attention at that time. After

the entire flock has been bred in this way, the ram should be allowed to run with the ewes for a few days, so that if any ewes should come in again he will serve them. Be careful to put on the entries the time of the serving of each ewe.

Peace and quietness should reign in the pastures at this time, as much worry, with handling unnecessarily, would prevent conception. The ewes should not be kept very fat while *enciente,* as they will not produce as large and good lambs when too fat. They should also be studiously protected from long continued chilling blasts. As a general rule our pastures have a good deal of undergrowth, and this will prove sufficient, especially if they are among shrub cedars, which is very common in Middle Tennessee. A very good plan to bring ewes into season, should they be slow to come so, is to give them a dose or two of Epsom salts, and shorten their feed for a few days. While it is wrong to make the ewes too fat, it is equally culpable to keep them too poor, as they cannot, in bad condition, produce a good, strong, healthy lamb. Their feed should be increased by degrees just before lambing time comes, as the draft of nursing will require richer food. At least a pint daily of grain should be given each ewe until the pasture becomes sufficient to keep them in thriving order. Turnips, and, in fact, roots of all sorts, should be avoided about lambing time, as they are said to produce abortion. Pea vines, especially the haulm of the peanut, are good food for ewes. It is almost a necessity for ewes to have laxative food before and after lambing; nothing is better, in addition to their grain, than a bite of green food, such as rye, winter oats, or wheat, two or three times a week before lambing, it has a tendency, to keep them thrifty, and in good condition, and it adds greatly to their flow of milk afterwards. We have known four-fifths of a crop of lambs to die from ewes that had become feverish and unhealthy from being grain-fed exclusively before lambing. If the record is kept the farmer

will know about the time of the expected lamb, and just before the time arrives the ewe should be separated from the others, and kept under shelter, especially at night, or in inclement weather. Many lambs have been lost by a want of attention to this easy precaution. The barn should be close, and if light can be excluded all the better. A clear dead wall all around the room will prevent the lamb from becoming hung or caught under troughs or racks. By this means the lambs will scarcely ever be disowned, as is often the case when they are mixed with the flock. A teaspoonful of oil will greatly hasten the emptying of the lamb's bowels, which are full of a sticky, glutinous mass, and it often accumulates in the wool around the vent, stopping it up. It is well enough to smear a little castor oil around the anus to prevent it. Sometimes the lamb is affected with scours. A little peppermint water and prepared chalk will correct it, though it may be necessary to administer it several times. Clip away any locks of wool from around the teats that may have been left from the tagging when sheared.

Sometimes, with all the precautions that can be used, the ewe will disown her lamb. There is no other recourse then but to use the "lamber." This is nothing more than a hurdle to confine her so she cannot turn around and butt the lamb. It will have several rails around it, and should she kick, a stick passed under her belly, slightly raising her up, will so fasten her that she cannot move. She is to be put in this lamber every time the lamb wants to suck, and will soon become accustomed to it.

A lamb left by the death of its dam, or a twin lamb that is too weak to suck, may easily be raised by hand. By taking the skin from a dead lamb, and rubbing it over one of the twins, the bereaved mother will often adopt it. Ewe's milk is best, but it being difficult to procure, resort is generally had to cow's milk, which, with the addition of a small lump of sugar, closely resembles ewe's milk in taste

and effect. A tin can, provided with a spout, or a coal oil can that has not been used, with a rubber nipple on the end, will be all that is necessary, and the lamb will soon know its feeder, running to him, butting around his legs, begging for its food. At first not more than a gill of milk should be given, and it should be warmed up to about natural heat, or one hundred degrees. After a few days, when the lambs begin to grow and play around, it can be given *ad libitum*.

While a ewe is suckling her lamb her food should be of the most generous character. Good clover or blue grass pastures should be supplemented with bran, oats, corn, or meal, and, in fact, if good lambs are expected, and early ones, the dam must be extremely well fed, as the food of the lamb must be derived from the mother, and if she has not the food she cannot be a free milker. Roots mixed with bran, oats, oil-cake meal, or grain will aid materially in the flow of milk. Pea straw is a favorite food for ewes, and it has more nourishment in it than any other kind of hay, as will be seen by a reference to the analysis. As soon as the lamb is large enough to notice other food besides its dam's milk, it should be tempted to eat a little wheat bran sprinkled in a trough, such as is mentioned in a previous chapter; or, some bright sweet clover hay will be apt to get a nibble. After it once begins to feed this way you can make it weigh heavier and grow more rapidly than it would on its dam's milk alone. A lamb that is pushed heavily by an abundance of food for the first three months will show itself by producing large vigorous sheep, while, on the contrary, if it is stinted of food for that time it becomes dwarfed, and will never make a good healthy sheep. All animals whose maturity is hastened will be stronger, thriftier, and longer lived than one that has been half starved in its growth. Besides, they make far better breeders. Should the pasture be bordered by a corn field it is a good plan, and one that is followed by many good

farmers, to make a hole under the fence large enough to admit the lamb, and yet withhold the sheep, into the corn field, provided the corn is tall enough to prevent the lambs from nibbling off the bud. They will eat the young tender shoots or suckers, and the bottom blades of fodder, that burn up and are lost anyway, and will not injure the corn. In this way they will be materially assisted in their growth and maturity. Should there not be a field or pasture to aid the lambs, a pen should be provided adjoining the "run" of the ewes, with an arrangement to admit the lambs, in which troughs are provided, kept filled with bran, meal, and anything calculated to aid in pushing the lamb.

It sometimes happens that a ewe loses her lamb, and in that case, to prevent "garget," or inflammation of the udder, the ewe should be milked a few times, never taking all the milk, and increasing the intervals of milking. In a few days the udder will become soft, and then the danger ceases. A few doses (twenty grains to the dose) of saltpetre will materially aid, by exciting the action of the kidneys. Cold water washing is good, too, for the udder when soreness prevails.

It is a mistaken notion on the part of many farmers that the best plan to improve the flock in all cases is to bring every year or two a new ram into the fold. In-and-in breeding has been established beyond controversy to be a necessary system of perpetuating a breed or species, provided, always, that a full-blooded buck of any kind is first started with. The celebrated stocks of Spain have attained their great superiority by this plan, and the sheep farmers of England have established, by the same system, the long wooled sheep of the Cotswold and Leicester breeds, as well as the mutton sheep of Southdown and Shropshire. It is of equal importance, however, that incestious breeding should be avoided; nothing has a greater tendency to weaken the constitution of a flock than too close in-breeding. It is an error that farmers are apt to fall into, especially if they

have an extra good ram, and they find it difficult and expensive to duplicate him. A skillful breeder will always, in selecting a breeding ram, be governed in his choice by the defects of the ewes he intends breeding him on; for instance, if his ewes are leggy and light bodied he will choose a short legged, heavy bodied ram to use upon them. A continual change of rams will get up a mixture of various degrees of excellence, but there is no reliance on the perpetuity of the stock, the lambs often taking after some inferior progenitor that is near of kin. But by carefully noting all the different points of excellence originating in a flock, and preserving only those that possess in an eminent degree the proper points to be gained, the breeder will soon have the satisfaction of seeing a uniformity of stock not to be gained by any other method. Therefore, do not go out for the cross, but pick within all the time. To do this the best lambs, both ewes and rams, must be preserved for breeding purposes. And the selection must be made and adhered to, with reference to the purpose in view. Should it be the intention of the breeder to improve the wool, then select entirely with reference to the wool, keeping in view, of course, that strength, size, rapidity of growth, tendency to fatten (whether the flock is kept for wool or mutton), must be always a pre-requisite. Then the length, quality, and fineness of wool must be the chief aim, in the parents as well as in the lambs.

Should, however, the breeder wish to raise early lambs for market, then those ewes that produce single lambs of large size and quick growth should be selected. In carrying out this idea it should also be kept in mind that the ewes which will give large quantities of milk, and eat heavily, will best fulfill this object.

If the production of wool is the object, ewes that produce twins, and are gentle, good nurses, are the most suitable. In either case the record book is indispensable, as it will be utterly impossible to make a proper choice of ewes with-

out it, as the memory will not do to trust. Good ewes for breeding purposes are only second in importance to a good ram; the latter gives quality to the entire flock, and the former only to her own offspring. "Good sucklers make good lambs" is only true in part, but with animals as prolific as sheep there is no reason why a farmer should not have all of his breeding ewes good individually as well as good sucklers. A ewe should have a large body, broad hips, a good feeder, and of gentle disposition. Never preserve, as stock sheep, poor or weakly lambs, or ewes that do not suckle well, or those that have weak constitutions, or ewes that are restless, wandering bleating over the pasture. Such animals should annually be eliminated from the flock, fattened, and sent to the shambles. While the ewe influences only the lamb she produces, the ram influences more or less the whole flock; it is, therefore, doubly important to exercise the utmost care and judgment in making suitable selections of bucks; indeed, it is a matter of prime importance. The character of the sheep, the number and quality of the lambs, depend to a great extent upon this choice. In making this selection the shape of the animal and the character of his wool should be taken into consideration more than his size or weight. It is not always that the large heavy fat rams are the best. They do well enough for the fairs, and exhibitions of stock, but not for the harem. We may here state that good thrifty-growing condition is much more preferable for both ewes and rams than to have them fat. Owing to the heat and flies, as well as short pasturage, sheep generally fall off in July and August, and when mated in September are generally in good breeding condition. A ram, with all the work he can do, will require and should have rich stimulative food, in addition to his pasturage; but the ewes should only have good pasturage until a few weeks before lambing, when bran and oats should be given them. Should mutton sheep be the desideratum, select one with rather

short small boned legs, round barrel, small head, full arms and thighs, close wool on the back, with fat on the ribs, where it is never found on a poor sheep, and, in fact, a general good appearance, rather than for any one special point of excellence. A well knit, smooth framed ram will possess more vitality than a large, long, loose one, and the effect will be very marked in the number and superiority of the lambs. In like manner the ewes should be selected that are very broad across the hips, as in that case the pelvis being roomy, the lambs will be more easily brought forth, without so often losing both lamb and dam. A disregard of this simple precaution often entails great loss on the farmer by difficult parturition and still-born lambs.

It is asserted by many writers that lambs bred from young bucks or young ewes are more often male than female. How true this is, if true at all, is not known to the writer, but it is a wise provision of nature to restrict the propagation of the species where the animal does not possess the vigor to make a perfect progeny, thus limiting, for the want of females, the supply of the breed. Large bones should always be avoided in sheep, as, indeed, they should in all animals, as the nutriment that would otherwise go to the formation of bone would tend to increase the size of the carcass, thus adding, with the same feed, to the quantity of flesh and wool. The selection of rams, however, cannot be taught by books, but must be left almost entirely to the tact and discretion of the breeder. As before stated, they should not be used upon more than twenty or twenty-five ewes until they are at least two years old, if possible to prevent it. High condition in the ram is not desirable, a mere fair condition promising better in getting lambs than one too fat.

No man must expect to accomplish in one year what it requires many years for others to accomplish in the perfection of a flock of sheep. It took the most careful attention of the most intelligent breeders to bring the four to six-

pound-fleece wooled sheep up to the twelve and fourteen pound fleeces, that are so greatly admired at the present day. There must be, therefore, an unwearied patience and indomitable energy and watchfulness to bring about any desired form or quality. Let the breeder first determine the nature and character of the flocks to be produced. He will then have to watch the desired form and fleece as seen in his flock, and then by separating, and breeding only those possessed of those qualities to rams selected, as mentioned, whose best points are where the ewes are most defective. The breeder will, in the course of a few years, have the satisfaction of seeing a flock of an established character, and able, by long breeding, to perpetuate and transmit those peculiarities to their progeny. Above all other qualities, be sure of the constitution and health of the sheep, as no amonnt of carcass or fleece will compensate for a sickly or tender frame. These difficulties may dampen the ardor of those men who expect in two or three years to enjoy the glory of establishing a breed, but this continued attention has been given to the Southdown and Cotswold in the United States for at least a half century, and was, for a greatly longer time, bestowed on the celebrated Spanish Merino in Europe. It is positively the only method of success.

MIXED BREEDS.

It often happens that for a certain reason the farmer wishes to cross his flock with other breeds. This is, under some circumstances, very advantageous, especially when he wishes, from a large wool sheep, to produce early lambs or mutton sheep. Almost every breeder of sheep has his own fancies in regard to the change sought. The first consideration is, which will be the most profitable, wool or mutton. This generally can be determined by the proximity of the markets. This once decided, the rest must be left to the experience and tact of the breeder. Should the farmer wish, without too much expense, to create a fine grade of

sheep from the common stock, he has only to procure a lot of ewes combining as many of the pre-requisites as possible, according to the rules laid down in previous chapters. Should it be desirable to raise lambs for market, it then becomes necessary to select from the fine blooded varieties such a buck as will bring about the desired end. It is usual to select a Southdown or Merino, and persons having tried it claim for each some peculiar reasons for preferring one or the other, which is a conclusive argument that either or both are good for the purpose.

By watching and talking with breeders one can get the result of their experience on the subject. The Southdown lamb will attain its growth quicker, and is larger than the Merino cross, and the black-face lambs are always a favorite with butchers, and in culling a lot of lambs they are invariable first taken. Yet the Merino has many advantages. Though smaller it is remarkable for vigorous health and for tenderness and juiciness of its meat, and when once tried will find many to advocate its claims. When once the breeder starts he must continue in the same direction, that is, he must continue with rams of the same breed, changing them for others as often as every other year, at least, and always selecting the best animal that can be procured. He can often do this without expense by making the change with a neighbor pursuing the same plan, thus equally benefiting both. Each year he can and should dispose of all the ram lambs, and keep the ewes. Upon this point the breeder must keep a watchful eye. There is as great difference in the value of ewes as there is of rams. None but the very pick of the lambkins should ever be allowed to breed, and then, if they prove poor, or are indifferent milkers, they should be fattened with the pen of old ewes that accumulates every season, and sent to the butcher. If he has ewe lambs enough to satisfy his wishes for breeders, he can, after the first year, sell off all the original native ewes, and thus his flock will consist of half-blood grade

Southdowns, or whatever cross he adopts. Each year of crossing will bring him nearer to the full stock, and when the flock has been crossed five times, they are in all respects full blooded, with this advantage, that the frequent crosses with fresh rams will have infused more life and vitality than was possessed by either before the process began. Nor should it end with the fifth, but continued *ad infinitum*, to prevent a retrograde of the flock, as there will continue to be a tendency to a relapse now and then for many years. It should be the duty and care of the farmer to watch closely any tendency to relapse, and the lambs exhibiting it should be promptly removed and consecrated to the shambles.

Should it be the desire of the farmer, on the contrary, to convert a flock of native ewes into long wooled sheep, the Cotswold and Leicester, independent of others, present as many advantages as he may require. The same rule as for producing a carcass must be observed, only the eye, instead of being directed to the frame alone, must keep in view the character, length, and texture of the wool. Of course he must also bear in mind that the better carcass the wool is on the better will be the fleece, so he must combine all these qualities in the ram. A very sightly broad-backed flock of ewes will soon satisfy his vision. The last named of the above species, the Shropshires, are little known in this country, being of comparatively recent origin even in England. But in the short time they have been before the country, they have attained a vast amount of popularity, chiefly on account of the prolific quality of the ewes. For the sake of those unacquainted with the breed we are induced to clip the following description of them from the "London Field," a high authority on all subjects connected with stock raising:

SHROPSHIRE SHEEP.

"The Shropshire sheep, though of comparatively recent origin, are at the present widely spread and much valued.

We know of no breed so prolific. The increase in all cases is to a certain extent, and often materially, influenced by the nature of the land—nourishing, or yielding, or inferior food. On an average, if the ewes are well cared for before and during the time the ram is with them, at least fifty per cent. of doublets may be looked for; and when Shropshire rams are put with long-wool ewes, the increase is much greater. On a small farm we purchase, every autumn, forty Banffshire ewes—a description of border Leicester, with a slight Cheviot cross—and serve them with a Shropshire ram. In 1872 thirty-six ewes produced seventy-eight lambs, all sold fat. This season the forty ewes produced eighty-two lambs, but owing to unfavorable causes we lost ten lambs, or such portion of the same as have not been already treated with mint sauce. This prolific tendency is a point of great importance, for it is not with the Shropshires as it is with some of the larger breeds, that a fine single lamb is more esteemed than a double. The ewes are good mothers, and can do justice to their offspring; moreover, it is always profitable to assist nature by nutritious diet. Next, the Shropshire is a hardy sheep, suitable for a large range of soils, and capable of close folding, without sensible loss of size. The yield both of mutton and wool is far greater than from the Southdown, or other short wool. Hampshires may arrive at greater weight, but they require more time. The proportion of bone and offal is greater and the wool much less."

We have no personal acquaintance with these breeds of sheep, but those having a knowledge of them commend them very highly. The character here given would commend them rather as mutton sheep than as sheep for early lambs. It is no uncommon thing to see a ewe with three lambs, and the late Hays Blackman, Esq., of Davidson county, had a ewe that raised four good lambs without any feeding except that obtained from her udder.

IN-AND-IN BREEDING.

This subject has given rise to more discussion than probably any other question connected with sheep raising. Many object to it from religious or moral considerations. Others contend that this method tends to weaken the constitution and debilitate the sheep, and the general appearance of the Leicesters originated by Mr. Bakewell, of England, by in-and-in breeding tends to confirm this objection. The small head, prominent, glassy eye, small bones, we say attenuated, their delicate skin, and general tendency to scrofulous diseases, would seem to be the result of too close and too long continued in-breeding. Still, close breeding is absolutely requisite to originate a species. This evil effect could be avoided to a great extent by adopting the rule to breed from the same ram only for the second generation, and by selecting another for the grandchildren with as nearly as possible the same form and general character. It is said to have less deleterious effects to breed a ram to his own get than to breed brother and sister together. The breeder could adopt a safer course, and one to attain the same ultimate result, by putting together animals of the same family, but less closely alied, as father or brother. I am strongly of the opinion that the same degeneration would take place in animals of a lower order, as is known to be the case with the higher animal, man. The result of in-and-in breeding in man is known to result in the highest type of personal beauty, but it is at the expense of the constitution and mental faculties. Besides, inter-marriages of families, long continued, often result in physical deformities, and this fact being so universally admitted in man, must bear some relative proportion in brutes. To breed properly have one well defined object, and keep that object always before the mind. To do this well it is absolutely necessary to know every ram and ewe in the flock, and their

general characters. To do this look to the record book already recommended, without which nothing can be remembered. Keep it also in mind that the ram must have absolutely pure blood, as his character affects the whole flock, and the slightest taint in him affects the whole flock. It is of the greatest importance that the ram should be thoroughbred, it matters not whether the breeder's object be wool or mutton. So strong is the tendency of the sheep to "breed back," or return to the native scrub, that even though a ram be three-fourths or four-fifths thoroughbred, at least two-thirds of his progeny will resemble scrubs more than thoroughbreds. It will, in the end, cost less to buy a good ram from a trustworthy breeder than attempt to raise the rams at home, as the admixture of new blood invigorates the breed. Bear it in mind, also, that there is a constant tendency to a retrocession to the original native breed, and it is therefore necessary to guard against this and cull out the offending animal. Without good feeding it is useless to attempt a fine display of sheep, as a few generations of half starved sheep will quickly end where it began. Want of food makes bad sheep, as without it the full development of the animal cannot take place, and the want is soon perpetuated in a diminutive size and inferior fleece. It is, in other words, easier to go down hill than to rise an ascent. Though the sheep, to all intents and practical purposes, are considered full blooded after five crosses, which brings them to thirty-one-thirty-twos, yet they are not, and according to the rule of arithmetical progression, never can be, and the lambs of some of those crosses will show the ancestry. Therefore, in breeding for thoroughbreds, the start must be pure. It may be proper here to state that a lamb, according to a legal decision, ceases to be a lamb when the first two permanent teeth appear, which is at one year old.

WEANING LAMBS.

The time usually allotted for the lamb to suckle is four months. The first thing is to separate the lambs and ewes, as far as possible, from each other, so that they will not hear each other's bleating. The lambs should be put on better pasture than they have been accustomed to, but it must not be too luxuriant. They should previously have been trained to eat plenty of salt, which is a good preventive of a great many diseases. A contrary course must be pursued with the ewes in reference to their pasture for a week or more after weaning. It can scarcely be too poor, otherwise it is frequently followed by great distension of their udders, and inflammation or garget. If this should be likely to occur they should be milked for a day or two, and fed with hay, or other dry food. After a week or more they should be placed on such pasture as will hasten their return in the shortest time to good condition.

Several eminent sheep raisers separate the ewes and lambs for the day, only turning them together at night, thus allowing the ewes to relieve their distended udders. By pursuing this course for a week or ten days the lambs will become accustomed to doing without the dam, and they are finally weaned without any ill effects to the ewe. Should, however, the udder of a ewe become inflamed, and danger of garget or abscess supervene, the ewe should have immediately a full dose of Epsom salts, say a heaping tablespoonful, with a teaspoonful of pulverized ginger, the two mixed in water. For the next two days give them, morning and evening, twenty grains of saltpetre. This will so increase the action of the kidneys, and cause a consequent determination of blood to those organs, that the udder is thereby relieved. Hay should be fed to them, also, instead of pasturage, thus giving them a quicker drying up.

PROFITS OF EARLY LAMBS.

In close connection with stall feeding of sheep comes the furnishing of early lambs of the best quality for the butcher. It is one of the most interesting and profitable branches of sheep husbandry in localities accessible to market. When carried on as a special business the production of butchers' lambs usually involves the annual selection of ewes for that purpose, which requires no little judgment in securing good nurses, possessed of vigorous constitutions, wide-hipped, broad, short-legged, early-maturing animals, the best that can be culled from the common flocks of the country. If the ram commences running with them in September, they will begin to drop their lambs early in February, and continue into March. They should have good pasture. If short cropping attends the coming of winter, the careful farmer will eke out the scanty herbage with corn, oats, or their equivalent, that they may enter upon dry feeding and the cold season in good condition. Then they are fed with hay and a little grain or oats. The winter feed, however, it is needless to add, can be varied greatly, and a reasonable variety is found conducive to health. As they approach the lambing season the heaviest should be separated from the flock, and fed as before, being careful to give some roots, but not so many as to increase very much the secretion of milk. Breeding sheep should not be too fat, they certainly should not be poor, but the "golden mean" is much nearer the former than the latter extreme. This may account for the different practice and counsels of sheep breeders, some affirming that the ewes should be kept on good hay till near the lambing time, and then allowed more stimulating food; others preferring to give hay, with a little grain, all the time, deprecating any increase. Near a railroad is the best location for breeding early lambs for market. Lambs cannot be driven, without

serious loss, a greater distance than ten miles. The shorter the distance the greater the profits. Very early lambs at sixty pounds weight are sold by our breeders at from three to five dollars each. From one station in Sumner county lambs to the value of forty thousand dollars were sold in 1878. And this business is constantly increasing, because Tennessee is the last State going South where prime mutton sheep can be raised, and their lambs come, therefore, into an earlier and a bare market.

CHAPTER V.

SHEEP FARMS—SITUATION FOR—GENERAL MANAGEMENT OF SHEEP—FOOD, MANURE, ETC.

Many things are to be considered to become a successful sheep husbandman. In the first place, he must determine to succeed, and with this principle thoroughly settled in his mind, half the battle is already won. He must possess tact and perseverance to overcome all obstacles, and not be drawn off to follow some other business because it promises a quicker return for his labor.

Then, being settled on this question, the next is to select a suitable farm for the business. Flat or wet lands are not suited for sheep walks, for, of all domestic animals, sheep are most injured by having their feet constantly wet, which induces foot-rot, a disease terrible in its ravages upon the flocks which it attacks. In any part of the State where the lands are rolling and the water-courses descend with rapidity, ensuring quick drainage, there is no difficulty about selecting a suitable situation. The swelling mountains of East Tennessee, whose tops are often bathed in clouds, and whose sides and crests are clothed in summer with a rich verdure, offer a fine field for this branch of husbandry. The writer has often seen magnificent flocks fleck the slopes of these mountains in summer, while the nestling coves at the foot give shelter and food during the prevalence of wintry blasts. So, also, the valley or trough of East Tennessee, on account of its natural drainage, has always proved exceedingly healthy for sheep. The Cumberland Tableland, with its dry sandstone soils, is famed for the healthfulness of its flocks. And coming further westward, we find a section of country whose wavy undulations of sur-

face and swiftly-running streams make it the shepherd's home. In the Central Basin of the State, and on the Rim surrounding it, more sheep are grown per acre of open lands than in any other portion of the State. A very large proportion of West Tennessee also has proved to be healthy for sheep, especially away from the marshy bottoms of the creeks and rivers.

Taking the State throughout, it may well be doubted whether an equal area can be found anywhere on the continent that presents so many charms for the flockmaster, and this, not only because of the ever-changing surface, but because of the abundance, variety and nutritiousness of the native forage plants.

Limestone and sandstone soils have in every country proved advantageous for sheep-raising. These, for obvious reasons, should be dry and porous. Soils of this character, too, will produce the finer and more nutritious grasses. All the famous breeds of the world are bred on such soils. The Leicester and Shropshires come from the red sandstone hills of those shires in England; the Lincolns are raised upon alluvial soils based upon limestone, while the Cotswold for centuries had its home on the Cotswold limestone hills; the Southdown and Oxforddown are native to the chalky downs of the south of England; while the only finely bred sheep of America, the American Merino, thrives best on the limestone hills of Vermont among the marble quarries.

Our alluvial soils will make splendid sheep farms, provided they are properly drained. In fact, the "bottoms" are not of necessity marshy or boggy, many of them having such a large proportion of sand that they keep dry. A good plan to determine this question, is to dig a hole in the ground about a foot deep, and if water stands in it an hour after a hard rain has ceased, it is a good indication that the land needs draining, and any land that requires draining is not good for a sheep farm.

One other matter should be looked to if it is intended to

confine the sheep to pastures, and that is good fences. Sheep are naturally inclined to jump, and an invitation, by bad fences, will surely be accepted. Straying sheep will soon be lost sheep, as, when once out, there is no limit to their travels, and many a flock has been totally lost for want of attention to this particular. Therefore, have good fences around the pastures intended for sheep, so they will never acquire the habit of jumping. With good fences, many good bargains may be had with the less provident farmers, who, annoyed by their continual straying, will often be induced to part with their sheep at a great loss.

A fold should be provided that is dog-proof. The country is often in an uproar from the depredations of one or two miserable curs in a single night. The farmer goes to bed proud of being possessed of a fine nucleus of a flock. He has carefully selected choice breeds, and spent many anxious hours protecting and caring for them through the winter months, and it is his delight to exhibit them to his neighbors. But some morning the unwelcome word comes to him, "the dogs have been among the sheep." Every one who has experienced it knows of the volumes of rage that swell his bosom. But it is all for naught. The mischief is done and the robber gone. Not a trace is left, except the dead carcasses of many sheep lying around, and the frightened, stunned look of the more fortunate ones that have escaped—escaped the dogs it may be, but they have suffered so much by fear they do not recover for months. They run at the approach of any one, they are restless, and the constant snort of some watcher startles them from their food, and, as a consequence, they lose flesh and become a shadow of what they were before. Sheep are very peculiar in this respect, and nothing disturbs their equanimity more than the inroads of dogs. All this can be prevented by the simple precaution of a fold. It is easily made, and will last indefinitely.

Select a suitable spot near the dwelling as may be. Let

it slope so that it will not become muddy or sloppy. Let it be in size to suit the number of sheep intended to protect. An acre of ground will suffice amply for from one to five hundred sheep. Let it be enclosed by any means that will exclude a dog. One used for years by the writer was made of pickets, cut eight feet long and put two feet in the ground, well packing and stripping it on the inside. It is not necessary to sharpen the ends, as, if closely put together, it will never be passed by dogs. Have an entrance by a door, so that when shut the fold is closed. If pickets are not convenient, a plank fence will answer equally well, only it will require more constant care to keep it in repair. About 1,700 pickets are required to make a fold, worth, when of cedar, $3 per hundred. It will cost seven cents a yard to dig the trench and put them up. The strips, four inches wide and one inch thick, will cost $1.50 per hundred feet, and the nails will cost about two dollars more. So a good substantial fold made of cedar, which will last, with slight repairs, at least twenty-five years, will cost say $75, which is a very small sum to pay for security and peaceful nights. If one wishes to economise, he can either enclose his barn with such a fence, or some other of his outbuildings that require an enclosure, and thus save a double expense. Thus, while his neighbors are continually annoyed by dogs and sustaining heavy losses with destroyed or harrassed sheep, he can turn the key on his flock and quietly go to bed, satisfied his flock will be safely in the fold the next morning.

The fold should be also sheltered on the inner side, to allow the sheep to feed during the long nights and be protected from the rain, as well as have good dry hay to go to. The shelter should be not more than four feet high, and the length of two boards will be sufficient. Next the fence racks can be constructed in the following manner: A round pole from the woods or a heavy scantling is laid against the bottom of the pickets, and secured there by stubs driven in the ground. Then bore one and a half inch holes in an

oblique direction, so that slats or rounds driven in the holes will have a slant of about forty-five degrees from the fence. Then fit on the other ends of the rounds a companion scantling, about four feet from the ground pole. This scantling will then serve as a support for the roof, letting one board extend from the scantling to the fence and another outwards, with the outer ends resting on a plate two inches square, which is itself supported by stakes, at intervals of six or seven feet, firmly driven into the ground. At intervals of eight or ten feet have some two or three boards nailed together, but movable, so they can be raised to put the hay in the rack. Then nail two planks, seven or eight inches wide, together by the edges so as to form a V-shaped trough, supporting or bracing it by nailing strips across at intervals of twelve inches, which will serve not only as a brace, but also prevent the sheep from throwing their food out. Nail this trough firmly to the ground pole of the rack, and there is a barn far better than the most expensive covering ever built by the amateur farmer. It protects them from rain and snow, and keeps their food dry and prevents it from becoming worthless from tramping and defiling. Should the flock become so large that all cannot eat at the same time, supplementary racks and shelters could be erected by building a fence or plank wall four feet high, and sheltering and racking both sides as their necessities may require.

Nor does the advantage of a fold stop with the security of the sheep. It is said the foot of a sheep is golden. During the day he distributes his rich manure over the pastures in an admirable manner, carrying it where most needed on the slopes and thin soils of the higher lands. By proper attention to raking and saving and sheltering, here can be gathered and garnered a rich store of plant food. And it is truly astonishing what a large amount of valuable manure can be collected in a short time. The litter, such as straw or leaves, that has been, or

should be, spread under all the sheds, will become saturated with the urine, and this, thrown on the general heap, generates an immense amount of ammonia, which, lodging in the mass of decaying vegetable matter, makes a manure unexcelled by any.

Sheep that have been kept up and fed during the winter, when turned on grass in the spring are very apt to scour, the *fæces* catching in the wool around the vent and on the thighs, forming tags. These tags sometimes become enormous, and serve, not only to impede the motions of the animal, but also to make a secure lodgment for insects, especially for maggots. These tags are a great annoyance to the lambs also. Sometimes drainage from the filth, held by them, trickles down on the teats, mingling with the milk. Sometimes they prevent the lamb from sucking altogether. Whether wet or dry, the wool can never be washed from it, and sooner or later it must be cut from the sheep. Tagging before turning out to grass prevents all this expense, waste and risk. So tagging should be practiced at once, cutting away all the wool around the vent and on each side of the thigh, so the dung will fall clear to the ground without touching any wool. It should also be cut from around the udder of the ewe, and from the scrotum of the buck. In doing this of course care should be taken to be gentle with the sheep and not injure the skin. Should a scar be made on the skin, cover it with a mixture of tar and grease, as this is a season of flies, and a nest of maggots would soon be made on any wound.

No one thing contributes to the health of sheep more than salting. It prevents injury from the great change from dry to green food, and will prevent the mass of herbage from fermenting in the stomach. The salt is better when mixed with epsom salts, copperas and sulphur; and the best plan of using it is to place a supply in covered boxes, protecting it from rain yet admitting it to the constant access of sheep, replenishing the boxes as often

as required. This combination will prevent injury from eating too much, as, if salt is too largely licked at first it is apt to produce scours.

Another precaution that is absolutely necessary should take effect at this time, and that is MARKING. The old barbarous custom of mutilating the ears of sheep has given place to other plans. Cutting the ear destroys the beauty of the sheep besides injuring their facility to hear, the ear being shaped precisely right to convey sounds to the drum. Some use tags of tin, sold by all agricultural stores, that have, marked upon them, the age and number of the sheep. This tag is placed in the lobe of the ear as a ear-bob. Both ends may pierce the ear, and then by bending and twisting it is permanently fastened. Others use paint. A convenient method is to mix lampblack or any other color with linseed oil, and, with a brush, make any shaped marks proper or desired, either the initials of the owner or a cross. Bucks should be marked on the rump, wethers on the right shoulder, and ewes on the left. Another plan is to use Venetian red, a very cheap paint, and one pound will mark a thousand sheep. Take between the thumb and first two fingers a pinch of the dry powder, then, drawing the enclosing fingers through the wool, letting the powder slip, any desirable mark may be made. The powder will unite with the grease of the wool, making a bright red mark, which no amount of rain will efface, yet without any injury to the wool, as it can be easily taken out by the manufacturer, which is not so easily done with lampblack and linseed oil. However, this operation should always take place immediately after shearing, except as to lambs; on the latter after docking. This process—docking—should take place when the lamb is a week or ten days old, or older if it is very weak. Some cut off the tail with a knife, while others use a chisel. The latter is much the best plan. Let an attendant hold it upright, rather leaning back, with its rump resting on a block; then, with the finger and thumb,

let the skin of the tail be drawn up towards the root, and placing a chisel on the tail about an inch from the rump, strike it a smart blow with a mallet and sever it at one blow. Have at hand a pot of tar, turpentine and lard, and smear the stump with it and turn it off. There will be little or no bleeding, especially if the operation is performed about night, so the lamb will be quiet soon after the docking. Castration should be performed about the same time. The longer this is delayed the more liable the lamb is to die. I have known every lamb to die from this operation being delayed until shearing time. This is a delicate operation and must be carefully performed. A cool day should be selected, and gentle hands to assist. Take the lamb with a fore and hind leg in each hand, and hold in an upright position with the back against the body; draw the hind legs up and apart, and press the lamb's body sufficiently hard to cause its belly to protrude between the thighs, exposing the scrotum to full view; then, with a sharp knife, cut about two-thirds of the scrotum off, and take each testicle in turn between the thumb and forefinger, and, after sliding down the loose enveloping membrane to the spermatic cord, pull out, not jerk, the testicle with a moderately quick but not violently jerking motion. The connecting tissues easily break, with but little bleeding. If any of the nerve should remain exposed, pull out and cut it off, as it must not be left. After cutting, place a quantity of the tar and grease in the scrotum and all over it, to keep off flies, and it will quickly heal. This operation should also be performed just at nightfall, to ensure quiet until it begins to inflame. Formerly castration was practiced far more than at present, and we think it better for the farmer to sell the buck lambs instead of converting them into wethers, as with the most careful operation many lambs will die.

Many persons suppose a pasture will suit sheep let it be composed of whatever herbage it may. It is true sheep will devour more sorts of herbage than any other species of

animals, yet it is equally true that there are more scraggy, rough sheep in the country than fine, fat ones. This is due to the difference in pasturage. Sheep, themselves, know all about this, and going into a sheep lot, it will be seen that the turf is eaten closely in spots—some places do not seem to have been touched, while others are cropped perfectly bare; nor will the spots that are left ever be grazed by them unless driven by absolute hunger. The whole animal is composed of the precise elements of the soil, and in order to advance the growth and health most rapidly, it must be seen that the products of the soil contain those elements essential to it. Clean, dry wool contains about 17 per cent of nitrogen and 5 per cent of sulphur in 100 parts; therefore, when the pasturage abounds in these principles and is abundant, the wool has a clear, glossy appearance and a considerable amount of a greasy, adhesive substance called *yolk*. This yolk serves to keep the wool in a lively, healthy condition; in fact, its presence in quantity is an indication that the sheep are in a healthy, thriving condition, as its absence is attended with a harsh, dry feeling to the touch, and the fleece is of an inferior quality. Potash enters largely into the composition of yolk, therefore food to nourish them properly must contain a proper quantity of potash and sulphur, besides nitrogenous compounds. From the following composition of the blood and flesh of a sheep it will be seen what a large amount of mineral substances are required in its food, viz.:

	BLOOD.	FLESH.
Phosphate of soda	16.77	45.10
Chloride of sodium (or salt)	59.34	45.94
Chloride of potassium	6 12	
Sulphate of soda	3.85	trace.
Phosphate of magnesia	4.19	6.84
Oxide and phosphate of iron	8.28	
Sulphate of lime	1.45	
	100.00	97.88

The bones are composed principally of phosphate and carbonate of lime.

The following is an analysis of the excrements of the sheep:

ASH OF DUNG.		ASH OF URINE.	
Silica	50.11	Sulphate potash	2.98
Potash	8.32	Sulphate soda	7.72
Soda	3.28	Chloride of sodium	32.01
Chloride of sodium	.14	Chloride of potassium	12.00
Phosphate iron	3.98	Carbonate of lime	.82
Lime	18.15	Carbonate of soda	42.25
Magnesia	5.45	Magnesia	.46
Phosphoric acid	7 52	Phosphate of iron, lime and magnesia	.70
Sulphuric acid	2.69	Silica	1.06
	99.64		100.00

These analyses show conclusively that the manure possesses an intrinsic value far greater than is generally supposed. It is naturally rich, and sheep chew so finely that, unlike other animals, they never sow the seed of weeds, the finest being thoroughly masticated. Of course the value of the manure is to some extent modified by the character of their food, as it is much richer when fed, for fattening purposes, on oil cake or corn. The following table will show its value as compared with other manures:

	Water.	Phosphoric Acid.	Potash.	Nitrogen.	Ammonia.
Pig dung	840 lbs.	8.0 lbs.	5.0 lbs.	7.0 lbs.	8.5 lbs.
Horse	743 "	12.2 "	28.0 "	5.4 "	6.5 "
Cow	864 "	5.2 "	10.7 "	3.5 "	4.2 "
Chicken	850 "	15.2 "	5.5 "	21.5 "	26.1 "
Sheep	670 "	22.7 "	7.0 "	7.1 "	8.5 "
Human	750 "	3.3 "	1.0 "	15.0 "	18.2 "

The fertilizing effects of sheep manure is better understood by the English farmer, who keeps sheep as much for the manure as for profit in other respects. This will be practiced in time by our farmers, but little attention to or appreciation of its use is now seen. An English farmer will sow a field of turnips, and by means of hurdles confine sheep to a particular lot until the turnips are all devoured, by which time the ground will be black with their drop-

pings, which, plowed under at once, gives a surprising fertility to the soil.

With the exception, perhaps, of goats, sheep will eat a greater variety of herbage than any other animal. Not only the grasses, but many weeds noxious to the farm, tender twigs and mosses are eagerly devoured by them. Lambsquarter, iron-weed, wild mustard, tongue-grass, and many other weeds contribute materially to their health. Of grasses that supply the necessary nutriment for sheep, as tested by the lights of experience, are those of low, creeping habits, with fine, short stalks, such as Blue-grass (*Poa pratensis*), Timothy (*Phleum pratense*), Sheep's-fescue (*Festuca ovina*), Spear-grass (*Poa annua*), False Redtop (*Poa serotina*), Redtop or Herd's-grass (*Agrostis vulgaris*), Orchard-grass (*Dactylis glomerata*), Meadow Foxtail (*Alopecurus pratensis*), White Clover (*Trifolium repens*), Red Clover (*Trifolium pratense*), Narrow-leaved Plantain (*Plantago lanceolata*), and many others. Few of our meadows that are artificially made are without one or more of these grasses, while in the woods the Nimble-will (*Muhlenbergia diffusa*), Crab or Crop-grass (*Panicum sanguinale*), and numerous others afford succulent, healthy food. Besides these, there are aromatic herbs or weeds, that possess, it is true, but little nutritive value, but from their stimulating properties they induce a good appetite, and, besides, a frequent change of diet is of the greatest utility in keeping up the health of the animal. Some experienced sheep-raisers sow mustard on open places in the pastures, which is a most toothsome morsel for sheep, and if allowed once to go to seed will perpetuate itself on the ground. Parsley, wormwood and yarrow or sneezewort are also greedily eaten by sheep, and are very advantageous to them. Parsley acts upon the liver and kidneys very freely, and should be given them when affected with the "rot." It is a biennial plant, and will, when once sown, perpetuate itself by sowing its own seed. We have no means of knowing the nutrient

value of the barren grasses, but we do know that sheep thrive on them finely, and come down into the farms in the beginning of winter thoroughly fat. The "Beggar's-lice" (*Cynoglossum Morrisonii*) that grows in unparalleled luxuriance all over the barrens and mountain lands of our State will keep sheep in fine order after the ripening of its seeds, but from the peculiar nature of those seeds they will ruin the fleece, no machinery being sufficient to take them out clean when once matted in the wool. The sheep themselves will eat many of them off each other's backs, but cannot get them out clean.

The value of the natural pastures can never be overestimated, and it only requires a sufficient number of attendants to sustain, until far in the cold weather, any number of sheep. A man with a couple of well trained dogs will easily attend one thousand sheep. The time will come, and at no distant day, when the whole range of our mountains will be flecked over with innumerable herds of sheep and cattle, thus turning all this great waste into substantial wealth. The only drawback to sheep-raising on the Cumberland Mountains, so far as the writer knows, is the presence of the calycanthus, the seeds of which, when eaten by sheep, are fatal. Fortunately these shrubs are confined to a few localities.

A great and fatal error into which many sheep masters fall, is overstocking. Not only are the sheep deprived of a sufficiency of food, but their stomachs become filled with sand and gravel by close nipping. This induces a thriftless condition, which ultimately ends in disease and death. They will also soon wear out their teeth, so that at four years old they no longer have teeth able to masticate their food.

Understocking is almost equally objectionable, as the grass will become hard and woody and lose its nutrient character. A just medium is hard to establish, but experience is the best teacher, and a farmer will soon be able to put on it just what stock as will keep it young and tender

and yet have an ample supply to fatten on. It is better to supplement with corn, oats, pea vines, turnips, or hay, than otherwise, if needed.

Sometimes it is better to divide the flock, keeping the ewes and lambs on the best and tenderest grass, and the wethers and bucks on the worst. Of course these remarks only apply to sheep confined within the limits of a farm. On a range it is only necessary to move the flock to a fresh spot when one becomes exhausted.

A flock must be closely watched to see that the pasture does not become exhausted. When the nourishment becomes insufficient the secretion that goes to form wool becomes arrested to a great degree, and there occurs a *"break"* in the fullness and strength of the fibre. This is not apparent to the owner, but the manufacturer discovers it at once, and the price is lessened. When it comes to be combed or carded the fibres will snap at this point of weakness, thus rendering the wool almost worthless. Overfeeding for a while, and then underfeeding, is more liable to produce these breaks than if the sheep had been kept on short allowance all the time, for then there will be an evenness in the fleece not otherwise to be secured.

A water supply is of the utmost consequence to the well-being of sheep, and this water, if possible, should be a living stream. Hard water, it is said, or water abounding in potash, soda and lime, is far better than soft or rain water, as it assists in supplying the salts that so largely go to the formation of the sheep. But this has not always proved true in this State. The soft water of the highlands has watered many healthy flocks. Should a flock become delicate, the constant access to boxes containing the following mixture will prove beneficial: Equal parts of salt, Epsom salts, bone dust, phosphate of lime, saltpetre, and a smaller quantity of copperas.

Attention should be given to the slope of the pasture, towards or from the sun. Nothing injures sheep more than

to be exposed to long and continuous blasts of cold wind. They produce much discomfort, that will, if continued long, result in sickness, drooping and death. Place two flocks on the different sides of a hill, and one can quickly see the vast difference that soon makes its appearance in the sheep. The wool of the northern slope will become harsh, whiter, less even, and the sheep will look dejected and drooping. The lambs are affected by it in a still more sensible manner. They lose their friskiness and seem not to wish to play.

It rarely ever occurs in our State, and that is one cause of its superiority as a sheep-raising country, that the feed on a good pasture becomes exhausted from heat or drought. But it does sometimes occur. When it does, the feed must be supplemented by green soiling. A prudent farmer will always have a crop of this kind to be used in case of emergency, as, if not used, it can easily be converted into hay for winter use. Peas, beans, millet, sorghum sowed broadcast, corn sowed in the same manner, clover, mustard, will, together with the dry food already saved, such as oats, hay and various others, answer all the purposes. With a scythe-blade and a sled, the sheep can, in a few minute's work, have their racks filled for the day's use.

The writer cannot pass without commending in the heartiest manner the use of sown sorghum as a green food. An acre, to be cut as used, and thrown in a rack under cover, will give an astonishing amount of green food. Its large quantity of saccharine juices is very delicious to all manner of stock. A farmer who once tries it, will ever afterwards provide himself with it. A bushel of seed to the acre, sown down on well-prepared, rich land, and harrowed in, early after frosts have ceased, will do in a couple of months, or even earlier, to begin on, and it can be cut over three or four times before it is destroyed by frost.

Rye for sheep should be sown in the corn-fields with the last plowing. Then, by the time frost destroys vegetation, there will be a wealth of green food for the stock.

Never sow less than two and a half, or even three bushels per acre. The only objection to a pasture of this kind is the danger of having the wool injured by burrs, so common on most of our farms and especially found in the corn-fields. The fault with the most of our rye pastures is the want of seed. Rye does not tiller like wheat, and, therefore, if an abundant pasture is wanted, put the seed on the ground and it will come. Sheep can run on a rye pasture until the first of April, or even later, when it can be broken up for a spring crop, and the droppings of the sheep will far more than counterbalance the exhausting effects of the rye.

Mustard is another valuable auxiliary to the farmer, not only as a stimulant during the summer, but as a food for winter. Sowed on a piece of cleared ground during September, or in the corn after it is laid by, it will afford fine pasturage during winter, and even when covered by snow the sheep will scrape the ground with their hoofs to get at it. It can be plowed down in the spring and not allowed to go to seed, and thus it will be easily got rid of after it has subserved its useful purpose.

Turnips, however, is and has always, in England, been the staple food for sheep. In Tennessee, for the most part, they are easily raised, and will stand out during our mild winters with but little loss. In England the plan of allowing sheep to feed off them in the field is fast falling into disuse, but it is on account of the excessive rains they have, which make the ground very muddy, and the sheep are necessarily chilled by exposure while eating them. But in our dry climate and porous soils the case is different, and we can and do allow our sheep to run out all winter. Turnips, as everyone knows, require rich land, and with proper cultivation a thousand or even fifteen hundred bushels are an ordinary crop. The writer of this once cut off the corn from two acres of new land. He broke it up well, and threw up ridges about two and a half feet apart, which was

too wide, eighteen inches being amply sufficient. He sowed at the rates of two pounds of seed per acre, and when the turnip leaves were about as large as a half dollar he thinned out to six inches in the furrow. The season was propitious, and the turnips crowded each other in the rows. The crop was not measured, unfortunately, but it was astonishing—fully one thousand bushels to the acre. To sow them properly, plow and harrow the land until it is in a fine state of tilth, then harrow and roll until it is perfectly level. After this, with a seed drill, sow at the rates of two pounds of seed to the acre, about fifteen or eighteen inches apart. Sow over them, just as they come out of the ground, one and a half bushels of plaster of paris, or about ten bushels of slacked lime. This will stimulate the plant and protect it from the insects that prove so destructive to young turnips. When they have formed three or four leaves, not later, thin with the hoe and hand to six or eight inches, leaving a single turnip to the place. Plow once thoroughly with a small bull-tongue plow, and the work for the crop is finished. Five hundred bushels is a small crop, and if the land is good it will oftener yield one thousand bushels.

The next question is, what kind of turnip is best suited for sheep? This is a question that will have to be decided by each one, based upon his own or the experience of his neighbors. Many prefer the yellow Aberdeen, as it is a large growing turnip, and yields heavily. If this is selected it must be sown nearly a month earlier than the other sorts. About the 1st of July is the proper time. If the rutabaga is taken it will have to be sown as early as the 15th June. Both are good varieties. The large Globe sowed about the 15th of August is a fine variety, or if sowing is deferred later, the farmer must of necessity use the quicker growing kinds, such as the flat Dutch, or Strap-Leaf. When the turnips are ready for harvesting, unless it is desired to feed them on the ground, they should be banked. That is, let them be pulled or plowed up, have the leaves cut off, place

them in piles to suit, and then cover about with two feet of leaves, stalks or straw, and a few inches of earth thrown over them. About as many turnips should be put in each hill as are required for a day's feeding, so that when a hill is broken it will be fed up before it is destroyed by freezing.

How will they be fed? There are only two plans, and sometimes both plans will have to be adopted unless the flock is large enough to render unnecessary the second. The first plan is to turn on the sheep and let them eat them in the ground, as they grew. When this plan is pursued, the owner gets the benefit of the foliage as well as the root. Sheep sometimes show a disinclination to eat them at first, but a little salt sprinkled on the tops to start them will give a taste that will soon cause them to eat gredily. If they are allowed access to the whole field at once, they will destroy and waste more than they will eat, nibbling here and there the green tops, and leaving the roots to rot. Therefore they should be confined to a particular spot until the turnips are consumed. They should never be allowed on more turnips than they will consume in two days and nights. One thousand head will consume one acre of good turnips every twenty-four hours, and the estimate can be made from this basis. A portable fence should be used to fence off a few acres at a time, and the sheep kept on this plat until the turnips are consumed.

Some farmers, and it is a most excellent idea, use hurdles to confine the sheep to pastures, as well as to turnip fields. Hurdles are made in the following manner: Take a four-square scantling, any length desired, and bore holes through it at right angles, one on each side alternately, about ten inches apart. Then put through these holes stakes six feet long. The holes should be two inches in diameter, and the stakes should be of good tough white oak. When completed, it will have the stakes projecting in four directions three feet long. Laid upon the ground it presents a *chevaux-de-frise* that no sheep will jump. A double row of

these laid across a clover lot enclosing ten or fifteen feet in width will confine the sheep to that spot, and prevent tramping and picking over the whole field. Not only this, but when they have passed over the field, which is done by simply rolling the double racks which they resemble, over and over, as the clover is eaten clean, the clover in the rear has renewed itself, and is ready for another going over. This plan applies not only to clover, but to any other kind of pasturage, such as sorghum, rye, Egyptian grass, or any of those cultivated grasses that will grow from the stub after being eaten down.

By judicious management of this hurdle a field infested with noxious weeds can be cleaned completely of them, and at the same time brought to a surpassing state of fertility.

But it is not always the case the farmer wishes to feed the turnips on the ground. They are then, as before stated, gathered before any hard freezing weather comes on, say about the 10th or 15th November, in this climate, and banked. They are now taken out and fed to the sheep as required. It is a great waste to feed them whole. Various plans are pursued to lessen the difficulty. Some boil them, and mix meal with them. But this involves so much time and trouble few will keep it up long. A more convenient plan is to cut or pulp them. A cheap machine that any one can construct for himself is to fasten four or six rough knives to a circular plank with a crank like that attached to a grind-stone. The knives must be screwed on the side next the hopper, and turned out to suit the size of the slice wished to be cut. A hopper holding a bushel is set on the frame, with the side next the knives open to allow the turnips to fall against them. Turn the crank, and they are quickly sliced, and fall into a trough below. These slices placed in troughs, with a little meal and very little salt, will make a splendid food for sheep. They will be sufficient without meal. Another machine is, instead of knives on the wheel, to have projections of iron shaped like

a morticing chisel, the chisel part coming through the wheel in large numbers, say a hundred or more. These points striking the turnips will rapidly tear them into pulp. It is on the order of an apple-mill. The wheel could be of cast iron, cast with the ragged points to answer the same purpose. Meal, oats or bran mixed with the pulp would make a most admirable food for fattening sheep. Oil cake is another food not much used heretofore in this country, but is rapidly coming into favor. So highly is this food esteemed in England for fattening purposes, that the cotton seed oil factories of Nashville ship all their oil cake to that far-off market, while our home farmers overlook its excellence. It abounds in nitrogenous principles, and makes the manure of animals fed from it of the most excellent character. The time, however, is not far distant when this diet will find a market at our own doors.

On every farm in the State of Tennessee may be seen the effects of careless culture, and this is especially the case on those farms that wholly or in part were devoted to cotton and tobacco in the *ante bellum* days. This effect is seen in galled spots on the slopes of the hills, or in huge gullies, that make the slopes like sinuous ribs. It should be the duty and pride of every farmer to eradicate these evidences of thriftlessness from his place. This is no easy task under ordinary circumstances, but it can be done with comparatively little work by the aid of a large flock of sheep. It is difficult without their aid, from the fact that the earth has been denuded of any soil to give a start to vegetation, and it can be done only by vegetation. There must be enough of soil on the clay to enable the farmer to bind it there by grass or clover, when the soil will soon accumulate by decay, and the eyesore will disappear. This, I say, can readily be done by the aid of sheep in the following manner:

Provide a number of portable troughs, made by nailing the edges of two wide planks together, forming a V shaped trough. Then nail strips either across the top of the trough,

or what is better, let the strips be raised in the center, making a point in the center which is raised, say a foot above the level of the trough, making a section of this appearance ◇. Under one end of the trough place a pair of rough wheels made of a circle of plank, and under the other end put a pair of legs marked thus ⋈. Then attach to the end opposite to the wheels a pair of handles made of plank also, and nailed to the sides, and the portable trough is finished. The raised strips will enable it to hold a considerable amount of hay, while the trough may contain any kind of food desirable to be fed them. This trough, or as many as may be required, should be placed on one of those galled spots, or among the gullies, where the sheep are fed, until the clay becomes black with their droppings, besides having large quantities trod into the earth by their feet. Then move it away, which is easily done by one man, to a fresh spot, and plowing up the place lately used, seed down with clover, grain or grass. Unless the farm is badly used up, it will soon be covered with verdure instead of being serried with gullies.

We cannot close this chapter without once more calling attention to the necessity of proper protection to the sheep from the inclemencies of the weather either by a fold provided with ample sheltering, or what is better, the fold and shelters about the farm for protection during the day. Sheep require protection from the sun as well as from cold. It is therefore proper on various parts of the farm, especially in those pastures that have been denuded of their shade trees, to erect sheds. These sheds can be made of the common clapboard—something like the sheds used by bricklayers—if a more elaborate building is not preferred. A convenient plan, and an economical one, is to build a shelter at the junction of four fences, if such an one exists on the farm. It will thus be accessible to all four fields by being cased around five feet high with upright boards, and having a door opening into each field.

Sheep should be constantly watched, and should any of them become diseased, they should at once be removed from the others and placed to themselves to be doctored. It is often the case that the diseases are contagious, and the danger of communicating to the other sheep should be avoided. A whole flock is often lost by want of attention to this necessity of carefulness.

To keep them in good heart frequent change of pasture is absolutely necessary. Sheep naturally love change, and one often wonders at the avidity shown in eating when passed from an old to a new field. If continued too long in one place they become restless, and will try to jump out and seek that relief their nature seems to require. To keep them quiet and contented, therefore, when they begin to wander about and become restless, change their quarters. The fields, if large, should be cut into smaller ones to accommodate this peculiarity, or if they are on a range, let them be driven to another section.

CHAPTER VI.

WINTER MANAGEMENT OF SHEEP—FOOD—FATTENING OF SHEEP.

When the snows and frosts of winter come on, the green succulent food of summer is destroyed, and a change has to take place in the character of the food. This change should be as gradual as possible to prevent derangement of the digestion of the animals. Therefore a short feed of dry food should be allowed before the grasses are entirely destroyed, unless the farm should be well set in blue-grass, which will keep the sheep supplied with a moderate support during the entire winter, except when the surface is covered with snow. Some of our Tennessee farms require the feed of sheep to be slightly supplemented with grains and hay, therefore one farmer seeing his neighbor with good lots allowing his flocks to get a total supply in his pastures is too apt, with insufficient grasses, to follow the example and not feed at all, or at least giving them such scant supplies as happen to be at hand. They make no special provision for them, and are very much surprised in the spring to see their flocks poor, debilitated, and with ragged coats of wool stripping here and there in patches off their sides. When one sets out to make sheep raising an object, he should supply himself with all the appliances necessary to make it a success. It is a difficult matter to say which is the more important, good feeding or good shelters, for sheep cannot possibly thrive with the snows and cold rains of winter penetrating all through the fleece. It is true sheep often, when supplied with shelter, will refuse it, preferring the open pasture, but this is when they have an abundance of good nourishing food. Many of our Middle Tennessee pastures are thickly set with shrub cedar, and this gives them a

fair shelter under ordinary circumstances. Besides this, a large portion of the "rim" lands of Tennessee, and all the mountain ranges, have a thick, heavy undergrowth of black jack, oak, hickory, and other sorts of trees, under which sheep are safely housed during the rigors of winter. But these natural shelters must be supplemented with an abundance of good nourishing food; and right here is the explanation of the frequent failures of sheep-raising in the barrens and on the table-lands of the mountains. Persons go there with large flocks, and run them on the ranges through the summer, and are delighted to see them in fine condition in the fall. Seeing an abundance of grass covered by the falling leaves and long-bent grasses, they believe they can successfully carry them through the winter without further food than that afforded by nature. But the leaves have hid much of the grass, and the snows more, and the grass by constant moisture has its nutritious qualities washed out, so that what little the sheep get is procured with much difficulty, and this being quite innutritious, the stomach of the sheep really will not digest enough to keep up its condition. Therefore they soon begin to lose flesh, the wool not receiving a proper nourishment is scant and rugged, and disease soon puts in to finish what starvation began. Thus it is that the cold bleak winds of March blow through them, destroying in some instances entire flocks. They will then pronounce anathemas against the country, and make every effort to deter others from making the same effort. On the contrary it rests solely with the flock-master whether or not the business should be a success. He should provide shelters sufficient to defend them from the severities of a mountain winter and store up food enough in his barns to keep up the condition derived from the summer pasturage.

To feed well, therefore, is the first duty of the shepherd, and to supply shelters only so far as is requisite to defend them from unusual cold so as to keep up the standard of health, is the second duty.

But few of our farmers are able to supply themselves with large, expensive barns, such as are used by wealthy flock-masters of the North, who sell sheep at from $25 to $50 the pair, and it is therefore unnecessary to go into a lengthy detail of such descriptions, for such buildings are, owing to our mild climate, unnecessary. Rarely are our winters so severe that the cheap shed previously mentioned will not be found amply sufficient for all purposes. We shall confine ourselves to recommending such accommodations as are within the reach of every man who is able to own a flock of fifty or sixty sheep. A suitable site should be selected, and it should, if possible, be situated on the crown of an eminence, so that the water will flow in every direction from the barn. If no such place prssents itself in a suitable location, some point should be chosen with a southern exposure. By all means avoid a north hill-side. Care should be taken to avoid a marshy or "crawfishy" spot, as no sheep can be kept in a healthy condition with wet feet all the time, as has been explained in a previous chapter. Then a yard should be laid off containing a half acre for every fifty head of sheep, well fenced with planks or pickets, care being exercised to have it dog proof. I have already explained the convenience of erecting sheds around on the inside of this fence, under which to place racks to shelter their food. But these racks are not entirely sufficient to protect sheep from the inclemencies of a winter. Therefore, in addition to these racks and shelters, there should be built a large shelter in the enclosure. It should or can be made by simply setting posts in the ground, and then covering with clap-boards; afterwards set a row of the same boards, say four feet long, all around it, leaving the space between the ends of the boards and the plate of the shelter open, so as to admit free ventilation. The shelter should have a steep roof for two reasons: In the first place, unless it is steep, the roof being large, will leak, making it sloppy. Then it will, if steep, present a large store for the

hay designed for their food. Indeed it would be better to run joists across the barn about seven feet from the floor, which will add a large additional storage room. A trough should be set on the floor running with the eaves, same length with the shed, and a rack made to rest on a pole placed immediately above the trough, not so high but that the sheep can easily reach the hay. At the other end of the rack strips can rest upon the joists above, making a space six or seven feet across at the top. With this arrangement a man in the loft can easily fill the rack from the hay above, which can be pulled down by means of a hook on a pole within reach of the sheep as they eat it. Thus the sheep will have free access to food at all times of the day, and being of that class of animals called ruminant, they, in a state of nature, are perpetual feeders. Another plan, and it is a very good one, is to place the shed at one end of the enclosure, making one side and two ends serve the purpose of the fence. It is only necessary to build the center building when the flock is over the ordinary size for 50, 75, or even 100 head. The cheap shelters referred to will be sufficient to protect them, for aside from the nights, we rarely have weather sufficiently cold to make the shelter desirable all day; in fact it is more a protection against cold rains and ravages of dogs at night that these shelters are chiefly valuable, for in Tennessee we never have the severe cold and deep snows that the Northern flockmasters have to contend with. Through our most severe winters we have but few days so cold that sheep will not leave shelter to graze. It is as important, however, for our farmers to have such shelters as we have described in order to be successful in sheep-husbandry, as it is for the Northern farmer to have his close and expensive barn, for the cold rains of the South are as apt to produce disease in our flocks as the deep snows and icy winds of the North are to produce famine.

One thing is essential in making these protective buildings, and that is they ought to be clean. There must not be

any more mud or slush around the building than is possible, and the floor, whether of the earth or of plank, must be strewed with straw for bedding. It should be the duty of one hand, at least twice a week, to rake up and cart out all the droppings and the old straw that have become saturated with the urine. If the manure heap is made within the enclosure, it must be so arranged that the sheep cannot sleep on it. If allowed, its warmth ensuing from fermentation, will be an invitation to the sheep to sleep on it. The gases, especially ammonia, arising from it, will have a very deleterious effect on their health. It is therefore absolutely requisite to have it without the enclosure or protect it from them.

To more effectually prevent the yard from becoming a slough of mud, it is better that the eaves of the shed should be guttered with either tin or two planks nailed edges together, forming a trough which, with a little attention, will answer all the purposes of a more expensive arrangement. This is more easily accomplished when the shed forms one end of the enclosure. Should, however, the shed be in the center of the enclosure, the water must still be conveyed from the yard by means of troughs, as otherwise in the winter it would be very difficult to keep it in a dry condition, and sheep more than any other animal require dryness under foot.

There is very little or no care bestowed upon the cleaning up and gathering together of sheep manure in our State. We are hereditarily a slovenly people in farming, and the value of manure has never been a factor in estimating the value of farm products. Sheep manure, from its coldness, does not easily ferment like horse dung, and therefore retains its value much longer than the excrement of the horse or man. It ranks among the very best of the manures produced by animals, especially from those sheep that are fed with rich food for fattening purposes. As has been already stated, the mastication of sheep is so perfect there is no danger of weed seeds coming up after having

passed through the stomach of a sheep. Both the urine and dung are very rich in fertilizing properties. Urea, the active principle of urine, has a large quantity of nitrogen in it, and sheep's urine contains, according to one of our best analysts, 28 parts of urea in every 1,000 parts, and 12 parts of salts, among which is a large proportion of phosphoric acid. In one hundred parts of the dung of sheep there are 68 per cent. of water, 19.3 of animal and vegetable matter, and 12.7 per cent. of saline matters. This 19.3 per cent. of organic matter contains as much nitrogen, which is the value of manure's chiefly, as 43 parts of horse dung, 63 parts of hog manure, or 125 parts of cow dung, and is equal to 100 parts of the ordinary stable or barnyard manure. It is much drier than other manures, having but little water, comparatively speaking. For instance, let a horse receive 100 parts of dry fodder, and he will defecate 216 pounds of fresh manure, which being dried, makes 46 pounds of dry manure, while the sheep with the same food would give but 128 pounds of fresh manure, making 43 pounds of dried. This is manure made with the ordinary method of feeding, such as hay, fodder, and such grass as they can pick up. But when sheep are fed with grain or other highly stimulating food for fattening purposes, with food rich in albumen and phosphates, the oil and starch only are assimilated and go to the formation of fat and flesh, while the remainder, including the larger part of the salts, goes to the manure heap, thus adding very greatly to its value as a land application. This fact has long been known and used to the improvement of land by the English farmer, and must be learned and practiced by our people. The declining fertility of our soils calls loudly for all the aid we can give it, and it is time to recognize the fact that if we continue to draw from the land, and never put anything to it, it will after awhile cease to respond to our calls upon it.

We dislike to repeat, but with the danger of being charged with too much repetition, we must once again call attention

to the value of oil cake in feeding, not only as a diet that rapidly promotes the collection of flesh and fat, but as a powerful addition to the manurial value of the barnyard. Those who have tried it are delighted with its effects. It is very rich in oil, and the manure falling from the cake-fed animal possesses a value beyond estimation. This fact has long been recognized in England, and that is why the oil cake from our oil factories is shipped to England instead of finding a market here at home. It is plain, however, that the reason is, because the fewest numbers of farmers, and I say it with great reluctance, save their manure at all. Those few who do, place no particular estimate on any given quality it may have, being content to spread whatever they happen to have, satisfying themselves if it is only manure. The dung of cattle or sheep fed on oil cake is so vastly enriched that it may be spread on a greatly extended area with far better results than can be obtained from ordinary manure of a much larger bulk, and the color of the grass or grain is darker, and can be discerned to the very row. Not only is it better in the long run, but its action is quickly seen, and its effects will remain long after the presence of the manure cannot be detected in the soil. Nor in the case of sheep does it require the tedious process of spreading, for they themselves distribute it so regularly and uniformly over a field that every blade of grass and every root receives its share, and by a more luxuriant growth shows the presence of the stimulant.

In estimating the size of sheds for sheep, 10 foot square, according to the most approved plans North, are generally allotted to each sheep. This, however, is more space than necessary in our climate, for the reason mentioned above, that it is only at night, and on cold, rainy days, that the sheep husbandmen in Tennessee require this shelter. The flocks with us are not confined to this limited space on account of snows or excessively cold weather, for weeks at a time, like they are in the less favored regions North. A shed 20 feet

wide and 50 feet long will comfortably shelter 125 to 150 sheep. It will be economy for the farmer to bed down under the shed with straw. Not only will it make an excellent article of manure, but it will protect the fleece from dirt, give a dry footing for the sheep, and make them more comfortable. For this purpose a good thick coating of straw should be first spread out. In a week's time this will be pretty evenly packed down and well saturated with urine, and covered with manure. A complete covering of fresh, clean straw should be spread over this, and as soon as it becomes soiled it should be removed, and a fresh layer spread out. If the sheep are housed every night the bedding should be renewed at least once a week.

In making racks for hay care should be taken to make them so close together as to prevent the sheep from getting their heads hung between the bars, and thus slaughtering them as is often the case, or they should be placed so far apart that they can easily thrust in and withdraw their heads. The ends of the racks should have bars placed across them or a fine young lamb will be found tangled in the bars occasionally, chilled to death. Three and a half or six inches should be the rule. In the first distance they cannot get in and in the latter they can get out.

WINTER FOOD.

This important subject will have to be treated under two heads, according to the requirements of the case. Under ordinary circumstances but little attention is paid to the diet of sheep save by those who have some extra fine sheep for sale. The large majority of Tennessee farmers run their flocks on the commons or on a fair winter pasture, and only feed during excessive cold rains or snow, and then in a very limited manner. The old rule of *ante bellum* farmers was one ear of corn to every ten sheep, which simply amounts to no feed at all. This was in addition to a few dirty shucks or the most inferior fodder, they had no hay, and the freedom

of a pile, not a rack or stack, of straw. To excuse themselves from stinginess, some old gentleman originated the idea that corn caused them to shed their wool. It no doubt had that effect in the quantity fed, but it was the want of it rather than the use of it. Many a poor sheep has bleached its bones upon the hillsides of Tennessee, a victim to this false aphorism.

Attention to the diet therefore falls under two heads; first, stock sheep; second, fattening sheep for mutton.

FEEDING STOCK SHEEP.

Fortunately for the Southern farmer there is no want of variety of food for sheep. Besides the winter pastures, such as blue-grass, mosses, barren grasses, rye, wheat and barley, we have hay of various kinds, such as timothy, herd's-grass, orchard grass, clovers, sorghum and dhoura; we have straws, pea vines, fodder, oats, peas, beans, corn, barley, rye, cotton seed and oil-cake, bran, meal, turnips, beets, carrots, rutabagas, mangel-wurtzel, and in fact our list of diet is equal to the bills of fare of the most fashionable hotels of the country. The sheep as nearly as any other is an omnivorous animal, and they will thrive on anything, from the buds and twigs of a thicket to the best of animal food. As has been already stated, but little special preparation is made for a flock of sheep, the owner being content to carry them through a winter on anything that may be at hand, in most instances contenting himself to let the sheep barely subsist upon the scant pickings of the field or forest. But as this work is not intended for a merely reading book, but to give such instruction to those seeking it as will enable them successfully to, not only carry their flocks alive through a winter, but to have them fit for market at any time during the year they may wish to convert them into food. Therefore we will first examine into the relative value of the different kinds of food, as the amount of nutrition each may contain

determines their relative value in dollars and cents. It may be that many of our readers will engage or are already embarked in the business of fattening sheep for market on a small farm where it is impossible for them to raise their own produce. When they have to go on the market for thier barn supplies it is a matter of no little importance to know which or what kind of food combines the more nutritious substances at a given cost. The appended tables will to such an one be invaluable.

In 100 parts of	Water.	Ash.	Organic matter.	Flesh formers.	Fat starch gum.	Crude fibre.
Meadow hay	14.3	6.2	79.5	8.2	41.3	30 0
Red clover hay	16.7	6.2	77.1	13.4	29.9	35.8
Pea straw	14.3	4.0	81.7	6.5	35.2	40.0
Bean straw	17.3	5.0	77.7	10.2	33.5	34.0
Wheat straw	14.3	5.5	80.0	2.0	30.2	48.0
Rye straw	14.2	3.2	82.5	1.5	27.0	54.0
Barley straw	14.3	7.0	78.7	3.0	32.7	43.0
Oat straw	14.3	5.0	80.7	2.5	38.2	40.0
Corn fodder	14.0	4.0	82.0	3.0	39.0	40.0

These analyses are taken from the hay cut in the blossom. If allowed to get fully ripe the crude fibre is largely increased and a corresponding depreciation of the fat and flesh forming principles ensues.

COMPARATIVE VALUE AS TO NUTRITION OF THE SAME MATERIALS IN ONE HUNDRED PARTS, TAKING ENGLISH OR MEADOW HAY AS A BASIS.

Meadow or English hay	10.0
Clover hay	12.5
Pea straw	16.5
Bean straw	18.6
Wheat straw	2.0
Rye straw	1.6
Barley straw	2.0
Oat straw	1.8
Corn fodder	2.5

Now in order to produce the same nutrition in an animal that ten pounds of meadow hay would give, there will have to be fed of

Clover hay	8	pounds.
Pea straw	6	pounds.
Bean straw	5½	pounds.
Wheat straw	52	pounds.
Rye straw	61	pounds.
Barley straw	52	pounds.
Oat straw	55	pounds.
Corn fodder	40	pounds.

Some allowances will have to be made for the various kinds of straw and hay, as much, indeed a large part, depends on the time of cutting, manner of curing and storing; the same hay or straw under different circumstances presenting very different nutritive effects. It will be a difficult matter to persuade our Tennessee farmers that corn fodder is four times less valuable than hay, as many of us believe it is almost equal, and many, that it is superior to any kind of hay. These analyses are from Professor Way, and he frankly admits that the fodder is estimated. We think his estimate is below its value, from the fact that this roughness has always heretofore, and still is, largely relied on to the exclusion of all others.

It however becomes very apparent from the insight given by these tables, that our usual method of depending on a pile of straw to feed cattle or sheep is a very precarious way of keeping them in order, or even alive. It is true the straws have a value, but just think for one moment of the amount of straw that must enter a sheep's stomach to enable it to live. It would not be impossible for a sheep to consume ten pounds of hay in a day, and yet to procure the same amount of nutrition that sheep must eat of wheat straw 52 pounds, of rye straw 61 pounds, and of oat straw 55 pounds. It is very evident from this tabulation that if they had no other food they would starve to death. With the addition of grain, or some other of the more concentrated forms of food, they can do very well with a constant access to the straw pile.

Our Northern brethren have long since adopted a system of raising quantities of roots adequate to the necessities of

the flock. This has so long been practiced by our English cousins that no farmer thinks of encountering a winter without a supply of roots in his cellar. It is proper we should imitate these customs that are amply proved to be beneficial, not only in affording food, but in keeping the flocks in a good state of health. It is true the roots do not contain a very great quantity of nourishment, but the large amount of water in their composition tends, in a great measure, to compensate for the dry fodders they otherwise would be confined to at this season of the year. To give a just idea of their value, we append a table from the work of Drs. Voelcker and Lankester, giving the value of each in one hundred parts.

TABLE OF NUTRITIVE VALUE OF ROOTS.

	Water.	Flesh formers.	Fat formers.	Woody fibre.	Ash.
Sugar Beets	81.05	1.00	15.40	1.03	.80
Mangel-Wurtzels	87.78	1.54	8.60	1.12	.96
Rutabagas	89.40	1.44	5.93	2.54	.62
Yellow Aberdeen Turnip	90.57	1.80	4.64	2.34	.65
Large Globe Turnip	90.43	1.14	2.96	2.00	1.02
Carrot	85.00	1.50	10.80	1.70	1.00

It will be seen by this table that a large proportion of roots is water, and yet, with all this, they are highly prized, not only for the beneficial effect they have upon the health and growth of sheep, but experience has demonstrated the fact that sheep fed largely on roots have a very fine lustrous wool, especially on the long wool species. The quantity of roots to be fed depends on the size and age of the sheep, old and large sheep requiring a larger allowance of roots than young or smaller ones. They should be always combined with hay, and the largest quantity given should not be more than one bushel to every ten sheep. As to the manner of its preparation, that has already been noticed. Cut or pulped up, and with a little bran or meal scattered over it, with a rack full of hay, the sheep need not go through a winter half starved and with poor wool, but will come

through in fine order; the lambs will be good, and will grow off in a corresponding manner.

It has already been stated that one acre of average turnips will yield about 800 to 1,000 bushels. The yield of beets and rutabagas will make but little less if any. One can therefore soon make an estimate as to the number of acres of roots necessary to winter a flock of sheep of any given number. One acre of roots will make say 800 bushels. This amount will feed 100 sheep 80 days, together with a small modicum of hay, say one pound per day, and a gill of meal to each sheep. Now, estimating the number of feeding months to be five, beginning with the 1st of November and ending 1st of April, it will require to carry, in prime order through that period, 100 sheep, 1,500 bushels of roots or the product of two acres, or at the most, three acres of good land. In addition to this it will require about four tons of hay and about forty-five bushels of meal. Of course this is a most liberal allowance, and the calculation is based upon the idea that they have nothing else whatever to eat. Owing to our mild climate and generous pastures, there is not one winter in twenty that our sheep will require such abundance of food. It is perfectly safe to say that one-half the amount of roots and meal mentioned above will be, in addition to the grass they will have through almost the entire winter, ample food to keep them in thrifty condition, and if the above rations were fed to them in addition to the pasturage, they would, in a few weeks, be almost too fat even for a butcher. None but those intended for the shambles should be fed so extravagantly. Breeding ewes should be fed liberally, especially after lambing, but to gorge them on rich food before lambing has a tendency to make them abort, and by taking on a superabundance of fat, cause them to become barren. It will be found best to change their food often, and at no time give them more rich food, such as turnips, beets, oil-cake, etc., than they will eagerly eat up.

There must be a constant supply of salt also and good

clear water. The mustard patch heretofore spoken of is a fine stimulant to the appetite during winter months. We refer the reader to the article on rye, wheat and barley pastures, which will be sufficient with the addition of very little grain indeed to take them well and fat through the cold months in Tennessee.

FATTENING SHEEP FOR MUTTON.

Much consideration is due to the age and previous condition of a sheep that is going to be prepared for market. From this circumstance it is absolutely necessary that the flock should be divided. The age must be thought of, whether it is growing or is in a state of maturity, whether there is a drain upon its powers as in the case of an ewe being with or suckling a lamb, or whether a ram is serving females. The flock should be graded to these views, and different quarters provided for each class. We give the following experiment of Dr. Voelcker, of the Royal Agricultural Society of England, as a sort of guide for giving the proper quantity and quality of different kinds of food:

He fed four sheep seven weeks and they consumed 196 pounds clover hay, 49 pounds linseed oil-cake, 3,743 pounds mangel-wurtzels, which gave a daily ration to each animal of 1 pound clover hay, 4 ounces oil-cake, and 19½ pounds mangels. The nutritive elements contained in this daily ration, according to our table, was 4⅛ ounces flesh formers, 53½ ounces fat formers, and 4¾ ounces of mineral matters. Here is the effect.

	Weight at commencement.	At end of seven weeks.	Gain of each in weight.
No. 1.....	153 pounds.	170¼ pounds.	17¼ pounds.
No. 2.	134 "	151¼ "	17¼ "
No. 3.....	170 "	187 "	17 "
No. 4.....	135 "	155 "	20 "

Each sheep gained on an average one pound in three days, or one pound for every fifty-six pounds of food consumed; or for every sixty-two ounces of dry matter contained in the food. It has been demonstrated by frequent experiment

that one hundred pounds of roots fed in a yard with shelters will give one pound of live weight to the sheep, or if fed in an open pasture without protection it will require one hundred and fifty pounds to produce the same result, or one-third more, and this relative proportion will hold with regard to all other kinds of feeding. If one and one-half pounds of oil-cake is given daily, the increase is two pounds for every 100 pounds of roots, which shows that four and one-half pounds of oil-cake will make one pound of mutton. When peas, beans and hay were fed with the roots it was found that eight pounds of the mixed grain would make one pound increase in weight, and oats fed with roots shows that seven pounds of oats, with the same quantity of roots as fed before, will give one pound of increase. Six pounds of barley would produce the same result. Messrs. Lawes and Gilbert in the course of experiments, established the fact, that to produce 100 pounds of mutton it was necessary to feed 272½ pounds of oil-cake, 252½ pounds clover hay, and 3753 pounds of roots (rutabagas). These experiments are recorded in the Journal of the Royal Agricultural Society. In summing up, they, taking into consideration the various conditions of the animals, the varying value of the feed and its quality, and all the circumstances of disturbance and repose in which a flock may be kept, came to the conclusion that, to produce one pound of flesh, it would be necessary to feed the following substances under a shelter, as it would require an addition of one-half of each food to attain the same result in the open pasture. This calculation too is based upon the idea of there being no other food in reach. It is as follows:

Rutabagas fed under cover	100 pounds.
Good clover hay	12 "
Beans or Peas	8 "
Oats	7 "
Barley	6 "
Linseed oil-cake meal	6 "
Linseed oil-cake meal and peas mixed	4½ "

Now the last item in this case shows curiously enough the value of mixed food. Of the oil cake it requires six pounds to produce one of flesh, and of peas it requires eight pounds, yet mix the two together, and it only takes four and a half pounds, or three-fourths of the quantity when mixed.

Turnips are more commonly raised for sheep food than any other root crop, but it is the result only of habit, and it is time the old rut should be abandoned and a new path marked out. As said before, few of our Tennessee farmers raise roots of any kind, but if once the habit of feeding with roots was established they would never fail in it afterwards. The large amount of water in roots prepares the food in the best possible manner for digestion, especially when a little meal is sprinkled over it. Of all roots, however, the sugar beet is preferable, as will be seen by the table, which is univerally sanctioned by experience. It is just as easily raised as the turnip, and is much easier kept. Sheep are very fond of it too, and will greedily devour every particle of it. The crop properly cultivated will yield from 600 to 1,000 bushels per acre.

They should be planted as soon as the soil can be put in proper condition in the spring. The ground requires the same preparation as to thorough tilth as for turnips, and should be mellow and well manured. After proper prepation it should be thrown up into ridges with a turning plow, and if possible planted with a seed-drill, which will distribute the seeds far more equally than can be done by hand, as from the rough nature of the seed it is difficult to sow it by hand sowing. Should the crop come up unequally, they can be easily thinned out and re-set, doing just as well as if coming up from seed. The transplanting should take place after a rain, when the ground is thoroughly wet, and while very young. Wring off the most of the tops before planting, and every one will live. Leave them about eight inches apart in the furrow, and they will

grow to fill up the space. They grow for the most part out of the ground, so that but little trouble is met with in pulling them from the banks. They should be put up in hills, and covered just as directed for turnips, unless the farmer should be blessed with a root cellar. From ten to twelve pounds should be given at a feed. There are various methods of feeding. Some farmers prepare the food, and put enough in at the morning feeding time to last all day, while others keep the troughs supplied all the time, only replenishing when the supply is about gone. But it is far better to feed three times a day at a regular hour, and only give enough, as can soon be ascertained by experience, to enable the sheep to clean the troughs at each feed. When more is given than they can eat, they will play and stamp on it, getting it so defiled they will not enjoy it, and only eating in case of hunger. Besides fresh food stimulates the appetite so that they will eat more than if they are surfeited at one feed.

"One of the most marked advantages of the South," says Mr. John L. Hayes, "is the ability to grow grasses which may be pastured in winter. Thus the cost of cutting the grass and saving the hire of the barn for storing it, and the cost of feeding it out, are dispensed with; while succulent food, which at the North must be provided for by storing roots and vegetables, is afforded throughout the year. By the aid of winter grasses it is perfectly practicable throughout a large portion of the South to raise sheep without other cost than the interest on the land and the value of the salt. Oats, barley and rye sown in the fall may be grazed during the winter without injury to the crop of grain, as is frequently done; but they must be sown annually, and are inferior to permanent grass pastures. The meadow oat, orchard and blue grass, with wild rye or Tyrrell grass, are chiefly relied on for permanent winter-green pasture."

Mr. Hayes might have added that for the latitude of Tennessee winter wheat furnishes more good grazing for

sheep than any other grain. A farmer who habitually sows one hundred acres in wheat can subsist a flock of fifty sheep throughout the winter without any injury to the wheat. In fact experience shows that a wheat field very forward is greatly benefitted by being grazed by sheep. It checks the growth, and secures it against untimely frosts in April or May. Throughout the wheat growing counties of Tennessee nine-tenths of the sheep are supplied bountifully with green food by the wheat fields alone, and are kept in a thriving condition. In a record kept for ten years by the writer, who lives on the northern boundary of the State, it appears that it has been necessary to feed sheep on an average only about twenty days during the winter months where two acres of wheat to the sheep have been sown.

But in those portions of the State where but a small amount of wheat is sown, it is necessary to feed as has been directed in the foregoing part of this chapter. Especially is this the case in the elevated or mountainous parts of the State. The greatest difficulty in raising sheep in the wheat growing sections is in giving timely attention to lambs in bad weather. When dropped in the open fields, especially during wet or very cold weather, many of them perish before they are able to follow the ewes, or are often left by the ewes where dropped. Attention at this time until the lambs are strong will insure a rapid increase in the flock.

Absolute quiet is a necessary requisite in fattening sheep. The whole flock should be made so gentle that every sheep will lick salt or take food from the flock-master's hand. No animal is more easily gentled than a sheep, and none thrive more by it. If dogs are allowed to go near them, and they are continually frightened, they will become so demoralized they will actually suffer from hunger while the troughs are full. There should be as little passing through the lot as possible, and they should have perfect repose. In a condition of peace they will thrive apace, and in six or eight weeks will be well fattened, for it only requires a short time

under favorable circumstances to get a wether in prime order. Confining fattening sheep within a small enclosure has the same effect as it does with all other domestic animals, producing a torpor, and thus promoting the taking on of flesh. This does not apply however to stock or breeding sheep, as the want of exercise begets a plethora in a ewe that is naturally disposed to it in that condition, and it injures the lamb, making it small and weak.

Fattening sheep for market is an industry, though very common in the vicinity of large cities, but little indulged in through this section. The construction of railroads, however, has made it a business that can be profitably carried on as well here as elsewhere, the transportation to market being fully compensated by the cheapness of the necessary food. Should a farmer desire to engage in the butiness he should devote his whole energies, time and attention to it. The fattening sheep should be kept apart from the stock sheep, indeed it is not customary for one engaged in this branch to devote much capital to the rearing of sheep. It now and then happens in a large lot that some are of necessity put upon pasturage or sold. The most successful men are those who have but a limited area of land, and that is devoted to the fattening process entirely.

In the first place it is necessary to state that in buying the stock the money is made. It will not pay to buy the common native sheep for that purpose. They will not take on flesh properly, and besides being of a roving disposition, the confinement necessary for fattening is irksome to them, and they will trot around the enclosure bleating, refusing to eat, until, with waste and spoiling, the food is rendered worthless. Therefore purchases should be confined to grade sheep of either Cotswold, Southdown or Merino crosses. The two first named are excellent varieties, the dark faces of the Southdown especially are very attractive to a butcher. The Southdowns make a fine tender mutton, but do not attain the same proportions as the Cotswold. It is no unu-

sual thing to find sheep of this breed weighing two hundred to two hundred and fifty pounds. The people of Tennessee are but little accustomed to see first-class mutton, such as is shown upon the stalls of a New York market, and consequently they will have to be educated to pay the fancy prices obtained there. It is no unusual thing there for a farmer to get 8½ to 10 cents per pound, while here with our ordinary wethers we are content to receive 5 and 6 cents per pound. But if the sheep are brought to the same condition here, the farmer who feeds them will easily get a figure far in advance of any of the ordinary prices now paid. A statement of Mr. Jurian Winne, of Albany county, New York, in regard to fattening sheep, in the Agricultural Department of the Patent Office, for the year 1869, will give some idea to our Southern farmers of how the thing is done better than a long description. He has followed it for years and amassed a large fortune by it. In this year he made but a small profit, from the fact that instead of buying himself, he sent out agents, and they paid very extravagant prices, and as already stated, the great profit lies in the purchase of the stock. The extremely heavy snows of winter, or rather late in the spring, kept him feeding longer than necessary, involving a considerable loss also. Still the final result is very satisfactory when we consider the small capital invested. Here is an abstract of his proceedings:

585 coarse-wool sheep cost him, with a small sum paid for pastures while gathering them up, December 1st, 1869, at $8.20 per head	$4,797 00
He sold 140 of these before he began feeding at 8½ cts., weight 130 pounds average	1,547 00
Which leaves the cost of 445 sheep	$3,250 00
Feb. 14, 1870, he bought 180 fine-wool sheep at $7.56 per 100 pounds weight—18,580	1,424 65
Total cost of all at start	$4,674 65

EXPENDITURES.

1,245 bushels corn at $1.00	$1,245 00
8 tons mill feed	204 00

300 bushels oats	150 00
134 bushels peas and oats	71 32
60 bushels barley	42 00
Oil meal	76 12
40 tons hay	320 00
Salt	20 00
Attendance—one man	120 00
Expense of selling	61 12
Total	$2,309 56
This amount, $2,309 56, added to cost	4,674 65
Makes a total for the fatted sheep	$6,984 21

SALES ACCOUNT.

April 7, 1870—247 coarse-wool sheep, weight 37,860 pounds, at 9¼ cts. net	$3,502 05
April 14, 1870—184 coarse-wool sheep, weight 28,320 pounds, at 9½c net	2,690 40
180 fine-wool sheep, weight 19,730 pounds, at 9⅛c. net	1,800 36
2 sheep with lambs	20 00
8 sheep butchered and sold	85 00
4 sheep died—lost.	
Total sales	$8,097 81
Net profit, besides manure	$1,113 60

The manure, judiciously used, forms no inconsiderable item in the above calculation. In this case, though not by any means a fair test, the owner derived a profit on the whole lot of about $1.80 per head, but on the fine wool sheep it was about $2.47 per head, and they were only fed two months. In the above case it may be observed there was no stint of feed; on the contrary, they received as much again as would be necessary in our milder climate. It is true the proximity to a large and favorable market caused a big price to be received for them, but at the same time here the sheep could have been bought for less than half the price paid, and the provender would not have cost more than one-third the amount it cost there. On the whole, the profit, considering the duration of the investment, was extremely fair, and it can be made here at the same or a better ratio.

It is the custom of many feeders to buy and sell continuously. They keep a large feeding lot, and keep a buyer out all the time, and every few days the flock is culled of all suitably fat. In this way there is no remission of buying or selling. There will for a few years yet be some difficulty in getting the sorts most profitable for fattening, the grade breeds, but that is gradually being overcome as the stock of sheep is being rapidly improved throughout the State. There are in almost every section of the State public-spirited men who devote their entire energies to the production of full blooded sheep, relying for their profits on retailing here and there a ram or ewe, and sometimes a pair, to their less enterprising neighbors, and this plan is fast improving the breeds of every neighborhood. In fact, only the "barrens" of the "rim" and the mountain lands are wholly given up to the unadulterated native sheep, and from these counties the ewes that go to the production of grade sheep are principally derived. The time is not far distant when the long-legged, naked-bellied native will disappear from our State altogether.

There is yet another class of sheep-raisers, who follow an entirely different system for profit, and inasmuch as they persist in it, we may suppose they find it profitable. They will make a selection of as many ewes as their farms can accommodate, in August. To every 35 or 40 ewes they will add a good Southdown or Cotswold buck, and put the ewes to them, say by the 15th of August. These ewes are kept in fine condition through the winter, and in the latter part of April they are sheared. The wool is sold as one part of the profit, and the lambs are sold off in the latter part of May, when the ewes are rapidly fattened and sold to the butchers. By the end of June the farmer has disposed of his entire flock, when he will clean up his lots, spread his manure, and in a month is ready to tread again around the circle. By actual demonstration, the following account will exhibit the profits of this method of farming:

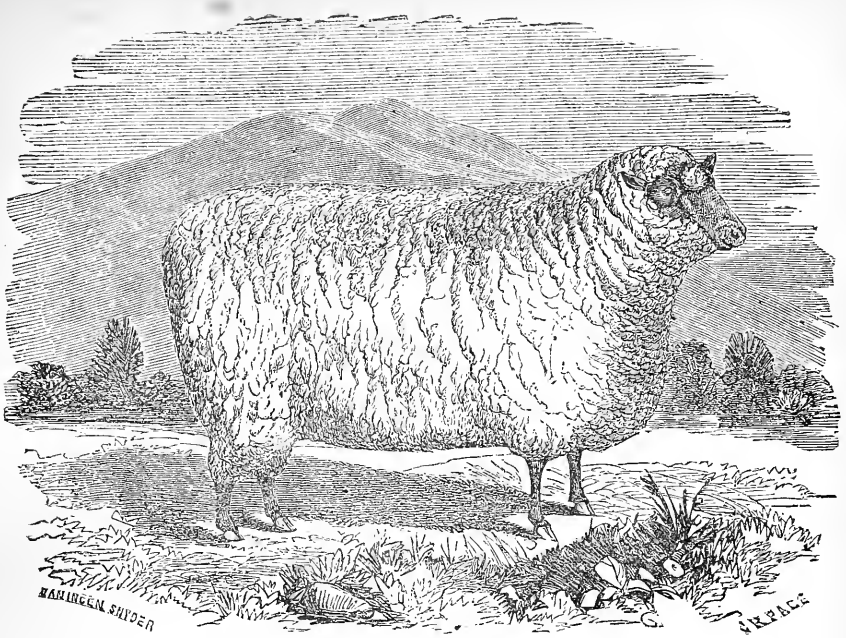
One hundred ewes at $2		$200 00
Four rams at $10		40 00
		$240 00
Average price of 80 lambs	$240 00	
Four hundred pounds wool at 30 cts	120 00	
Four rams at $10	40 00	
One hundred fat sheep at $5	500 00	
		$900 00

The manure will well repay the attention given them, and the only money expense attending this transaction is the food necessary to be used during the hard weather of the winter. Those who follow this plan usually are well supplied with blue-grass pastures and the food raised on the place; so that, in selling the sheep, they really are only selling their crops at a full price, as well as utilizing the grass that would otherwise be lost. It may be objected that no deduction is made for incidental loss of sheep; but every flock-master will testify that the surplus of lambs over 80 per cent will fully compensate for all losses, unless the farmer is criminally negligent and suffers, for want of proper protection, his flocks to be destroyed by dogs and starvation. Here is a gross profit, on an investment of $240, of $660, and estimating the feed, over and above the grass, to be $1.50 a head, there is a net profit of $350. Remember, too, that the $300 go into his own pocket for farm produce, and we cannot think of anything a farmer can raise on his farm that will surpass this small investment. By taking care in the purchase, he can often get the ewes for a less sum than here stated, and I am sure the prices received are of the most reasonable character. The earliest lambs, indeed, rarely sell below four dollars each, while the latest ones, provided they are good and fat, will bring the estimated price, $3.00. So this must be taken as a fair average experiment.

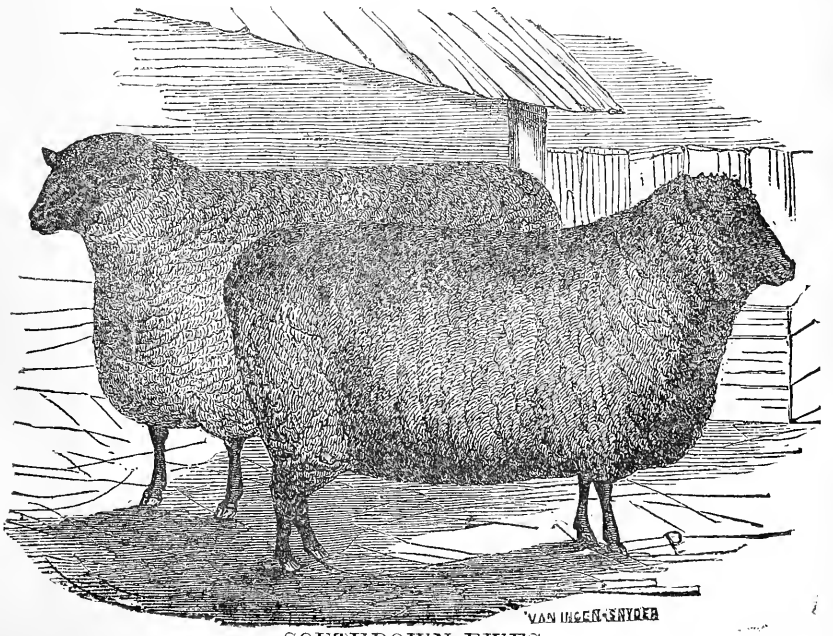
Another gentleman bought 25 ewes in August, for which he paid $75. In the following May he sold the lams, num-

ber not stated, for $101. In May he sold a portion of the ewes for $98.70, and in June the balance for $72. He got $60 for the wool. Allowing the food to cost fifty cents per head—and it did not exceed this, as grass was almost wholly used—and a net profit of $244.20 was realized.

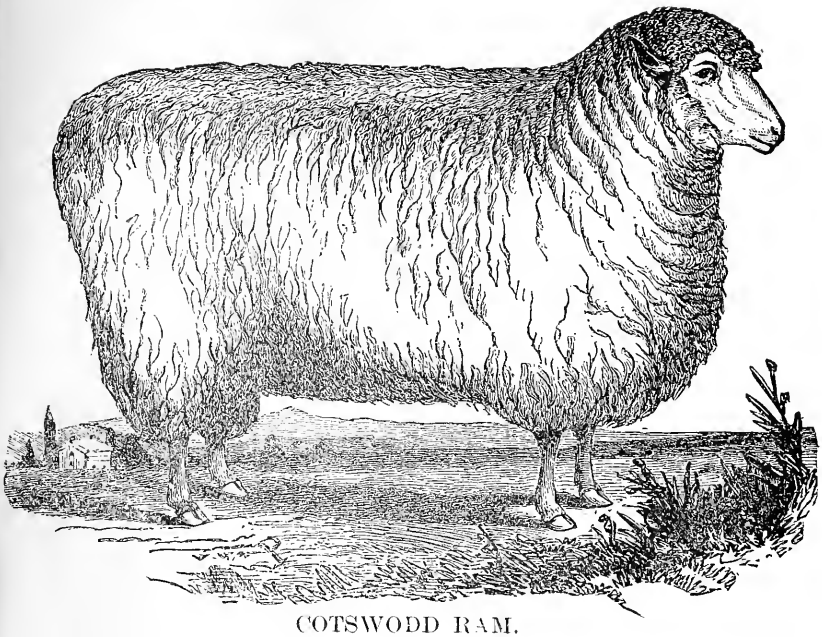
Summing up the whole subject, it may safely be asserted that in its various branches, whether as wool, mutton or lamb sales, there is no branch of agriculture that offers greater inducements to the farmer than sheep-raising. The sum necessary to get a start is by all odds less than in any other branch of stock-raising, and its returns are quicker. Not only does it remunerate the farmer by replenishing his pocket, but it replenishes the land. The dilapidated condition of so many of our Tennessee farms strongly points to some method of agriculture that will arrest the great waste of soil and renew the lost fertility. This method is feasible and cheap. I do not intend to enter into a long dissertation as to the profits of sheep-husbandry in general, or as to its value in Tennessee in particular, being content to simply give the most approved compendium of the subject, tested by the crucible of experience, and with the facts here given before the farmer he must be his own judge as to whether or not he will engage in the business. There is scarcely any person raised to the years of maturity in Tennessee who has not had more or less experience in the business, obtained by working with sheep himself or observation on the farms of others. This experience, however small, will render him a fit judge of the profits of the business. Should he have any doubts about it, let him begin on a very small scale—it is better, anyway, to do it—and then let him drive the business. He will be sufficiently taught in its details as he goes to avoid any serious mistakes. He may expect changes and variations in the amount of remuneration from year to year, but no such slight matter should deter him. Let his mind be fully made up before entering the business, and then let him not drop off at the appear-



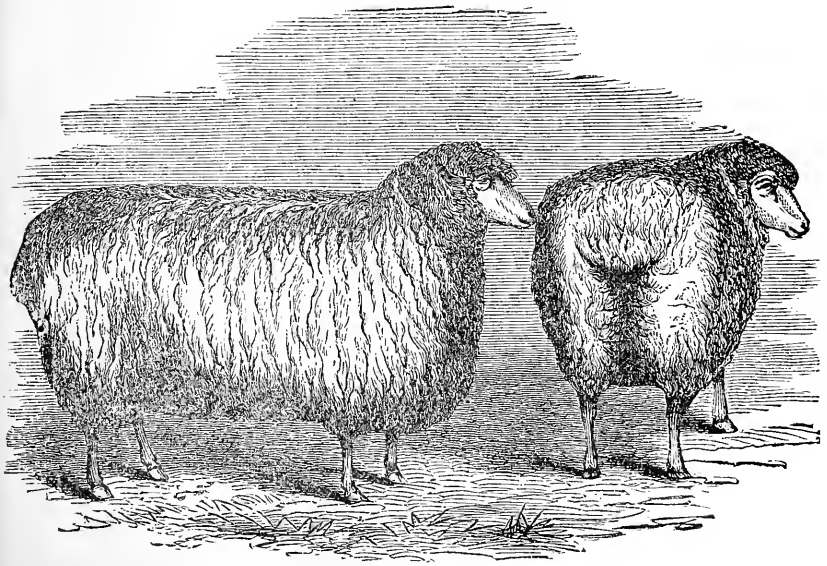
SOUTHDOWN RAM.



SOUTHDOWN EWES.



COTSWODD RAM.



COTSWOLD EWES.

ance of some *ignis fatuus* that promises to be a bonanza, but with eyes steadily fixed upon some point to be reached, strive to attain it. If he does this, and uses ordinary foresight and necessary precautions to the success of any business, he will without doubt attain it.

CHAPTER VII.

THE MOST POPULAR BREEDS IN TENNESSEE.

(See answers to questions in Appendix.)

Of all the improved varieties the Southdowns, the Cotswolds, and the Merino, in the order named, are the most popular with the breeders of Tennessee.

SOUTHDOWNS.

This breed has existed for more than two centuries in England on a range of chalky hills known as the South Downs, from which this breed derives its name. As late as 1775 but little progress had been made in their improvement, and although noted somewhat then for their mutton qualities, they were small and inferior compared with the Southdowns of the present day. They are an upland sheep, of medium size, of round compact form, and their wool, in point of length, belongs to the middle class; it is deficient in felting properties, makes a fuzzy, hairy cloth, and is used by manufacturers in making worsteds. The average weight of fleece is from three to four pounds.

This breed is cultivated more especially for its mutton qualities, and in this particular they take precedence of all others. They mature early, are industrious feeders, though not much disposed to roam, and they take on fat quickly and evenly over the entire carcass. They are prolific breeders, and good mothers. They are not as long lived as the Merino, and like most all other breeds their fleece decreases in weight after they pass maturity. Thoroughbred rams of this breed are exceedingly valuable to cross upon the common ewes of the country, and it is estimated by competent and experienced breeders that the lambs from this

cross are worth from seventy-five cents to one dollar more per head than lambs of same age by a common ram.

Of the three varieties mentioned at the commencement of this chapter the Southdowns, next to the Merinos, can best adapt themselves to any portion of the State, and while they are an upland sheep, and will thrive to perfection on the Table-lands, they will do equally as well on the rich pastures of the middle and western portions of the State, though in flocks of smaller size. They are growing more rapidly in popular favor South than either the Cotswolds or Merinos. One hundred ewes of this breed will have one hundred per cent. of lambs, the twins occurring as often as barren ewes.

COTSWOLDS.

This breed stands first of all others for the excellence and quality of the fleece for combing wool. It is strong and mellow, of good color, about from six to eight inches in length, and the fleece will average from seven to nine pounds.

The Leicester or Bakewell were the first long-wooled sheep introduced into the State, and for many years they were unrivaled in popularity. Their fleece, though not quite so heavy as the Cotswolds of the present day, was finer in texture. They could not compete successfully, however, with the heavier carcass, as well as fleece, of their more hardy rivals, and have almost entirely disappeared from the State to make room for the Cotswolds.

This breed do not rest their value alone upon their fleece, but claim much merit as a mutton breed. On good pastures the matured sheep take on flesh quickly, but do not distribute it evenly like the Southdowns, but pack it in "patches" about on the carcass, neither do they "marble" their flesh (distribute the fat amongst the lean meat) like the Southdowns.

The ewes are very prolific breeders, and generally good

milkers. The lambs are large framed and hardy, and although not so apt to fatten from the start as Southdowns, they are considered only second to them in mutton qualities. The rams from this breed are also extensively used upon the common ewes of the country with great benefit. No breed will make a more marked improvement on the common sheep than a Cotswold ram will when bred to scrub ewes. The first cross will oftentimes treble the weight of fleece, and at the same time greatly increase the size and improve the form of the native. On this account they are in great demand by those who desire to combine as far as practicable both fleece and mutton qualities in their flock. These advantages are referred to further on, where we speak of the different crosses and grades.

The Cotswolds are of large, heavy frames, long, heavy fleece, are rather unwieldy, and not industrious feeders. Hence they are not so well adapted to the broken, hilly regions of East Tennessee, nor the hot sun and somewhat scant pastures of the southern and western portion of the State. They must have level pastures and a frosty climate to give the best results. Much can be done, however, by a proper system of breeding and acclimation. Some of the best results with Cotswolds in the State have come from a continued and systimatic course of breeding, beginning with the common scrub ewes. The experiment referred to was made by Col. Tom Crutchfield, of Hamilton county, and is mentioned elsewhere in this work. The result of his experiment is that with only several removes from the scrub ewe, he has a pure bred Cotswold sheep, heavy fleece of good quality, and a sheep well adapted to our Southern climate and undulating lands. These are equally as prolific as the Southdowns.

MERINOS.

This breed, although natives of a warm climate, become inured to extreme cold. They flourish as far north as

Sweden, but in such an extremely cold climate their wool loses much of the fine texture that characterizes it in its warm native land. This is the oldest breed of sheep known and most widely disseminated. The Merinos are the longest lived of all other breeds, and instances have come under our own observation where ewes fourteen years old would drop fine healthy lambs and raise them. They are not prolific breeders, in this respect not equal to either of the other varieties. They are regular breeders, however, until seven or eight years old. Notwithstanding the longevity of the Merino, and the excellent health that is characteristic of this breed, the lambs, when first dropped, appear to be weaker and more delicate than those of any other breed. This is only the case, however, for a few days, after which they seem at once to inherit the characteristic thrift and hardiness of their tribe, and the percentage of loss by a disease in a flock of Merinos, after the lambs are two or or three days old, is far less than that of any other breed of sheep. They are slow at arriving at maturity, and are not considered thoroughly done growing until they are three years old. This renders them, necessarily, the least desirable as a mutton sheep, although they are by no means inferior in this respect. They mature slowly, and do not take on fat as quickly as either of the other breeds; but after having reached maturity they fatten kindly. The flesh is firm-grained, and, as mutton, is juicy and well flavored. As the Merino is the oldest, it is also the hardiest of all other improved breeds. They are alike thrifty on uplands and on flats, in cold or warm climates, and on scant or luxuriant pasture. The various conditions under which this widely disseminated family of sheep are bred, change to some extent the quality and quantity of their fleece, as well as the size of carcass; but under all circumstances, and in the various climates, they are noted for their fine fleece and hardy constitutions, enabling them to herd in larger numbers than any other variety without detriment, or endangering the

health of the flock. These valuable qualities they transmit to their offspring to a great extent, and for this reason they are, as they deserve to be, the most valuable to cross upon the common sheep of the country. About eighty per cent. of lambs is about the usual average for the ewes.

Considering the fact that Spain has been for many centuries the fountain head whence are derived the full blood of the Merino, it will be a matter of interest to many to read the subjoined pages from the report of D. J. Browne, who is an eminent author and traveler, and who wrote this for the Agricultural Bureau at Washington. It will also be a suggestive essay on sheep raising on the plateau lands of Tennessee; nearly every thing done there can be done in Tennessee. To those who design following the business on the plateau lands the following is especially commended:

SHEEP HUSBANDRY IN SPAIN.

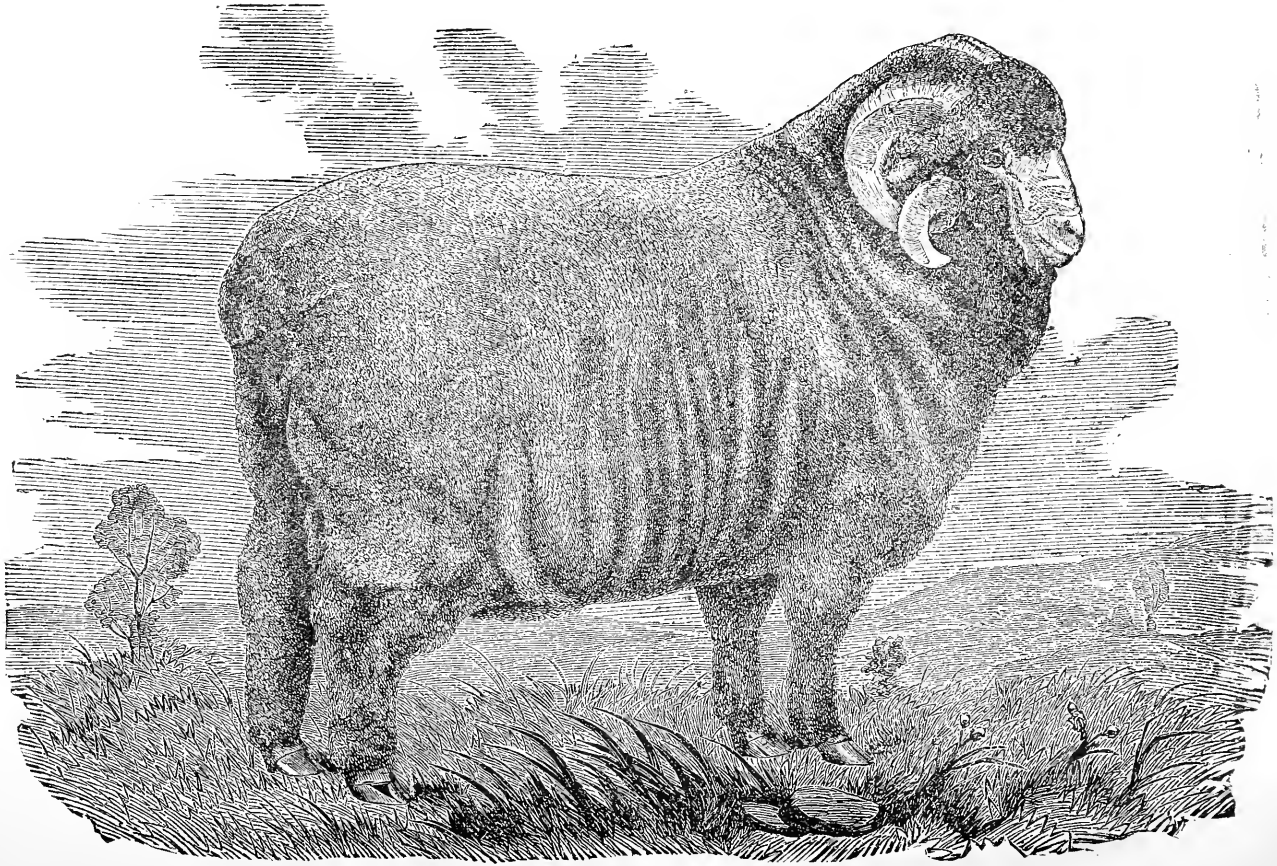
In the course of my sojourn in Spain, in 1833, I made it a point to visit some of the sheep-walks, with the view of procuring such information from the shepherds relative to the management of the Merino as could be drawn from them. The result of those inquires, together with other facts since obtained, are embodied in the following paper, which it is hoped may prove of service to some of those who have embarked in this important branch of rural economy. D. J. B.

"In Spain there are at present two domestic breeds of sheep, which differ widely from one another, both in their habits and in the properties of their wool. One kind has, for a long period, existed in the warmer parts of that country, and is known by their long, coarse, hairy wool; and the other, which migrates every spring from the plains and valleys of Andalusia, Estremadura, Murcia, Valencia, and Catalonia, to the cool mountains of Old Castile and Arragon, where they pass the summer, and return again in

autumn to feed during winter on the warm plains below. The latter, which includes the pure Merino, are distinguished from the common sheep by a loose skin hanging from their necks, and in having wool on their foreheads and cheeks, and frequently down their legs nearly to their hoofs. The horns of the males are very large and ponderous, and are usually rolled laterally, one part over another. Their wool is long, fine, and soft, and is twisted into glossy spiral ringlets. It naturally contains a large proportion of oil, to which dust and other impurities adhere, and give to the animals a dingy and unclean appearance, that conveys to the casual observer an idea of inferiority, but on parting it all doubts are immediately removed, when its unsullied purity and fineness are brought to view. There also exist in Spain several intermediate breeds, among which are the Pyrenean races, with remarkably fine wool, and somewhat resembling that on the South Downs of England. In general they are polled, but some have horns, which turn behind the ears, and in the males project forward half a circle. Their legs, which are short, are white or reddish; their faces speckled, and in some a small tuft of wool grows on their foreheads. Their color varies from white to a reddish yellow, and in a few instances they are entirely black. There is also another race in Biscay, which have from four to six horns, but they are not of the fine wooled variety.

"The example of Columella, of importing African rams, was repeated by Don Pedro, King of Arragon, in the early part of the thirteenth century, and afterwards by Cardinal Ximenes, prime minister of Spain; and to that epoch is to be ascribed the superiority of Merino wool over that of all other domestic breeds. With regard to the cause of this superiority, some impute it to the sheep passing their lives in the open air, in a dry and equable climate; others to the nature of the soil and vegetation upon which they feed, and to their migrating semi-annually from one part of the country to another; and a third class, to the peculiar man-

ner of smearing their backs at a certain period, a process hereafter to be described; but it is most probable that they do not so much owe the fineness and quality of their wool to the reasons above assigned, as to the uniform, systematic, and unceasing care with which they are managed through every stage of their existence, and the pure, unmixed, and isolated condition in which each flock is kept from generation to generation. For it appears as a matter of certainty that the sole design of removing these sheep from one district to another is to feed; and it is equally certain that these journeys never would be undertaken if a sufficiency of good pasturage could be found in one place during the year; and, besides, it is a noted fact that there are stationary flocks in the plains of Estremadura, where frost is seldom seen, and about the mountains of Old Castile, where snow often falls in June, both of which produce wool of an equal degree of fineness to that of the itinerant flocks that change their quarters every six months. It has been asserted, and believed by some, although controverted by several well-informed persons, that regions abounding in aromatic plants are more favorable to the health of sheep, and, consequently, to the fineness of their wool, than those entirely destitute of such plants. Two instances, well supported, will, perhaps, be sufficient to refute this opinion. The territory of Montana, in Old Castile, is one of the most elevated tracts in Spain, where the neighboring mountains rise in the atmosphere to a line of perpetual snow. Its hills consist of sandstone, covered with a deep clayey soil; black marble, marked with white and yellow veins; grey limestone, containing marine petrifactions, talc, gypsum, and numerous saline springs; and in the plains and valleys emery abounds, both occurring in large blocks and incorporated in the soil. The soils of the mountains and hills are noted as being of a similar composition with the rocks beneath them; and experience has taught the Spanish farmers that the sod which covers the limestone districts is best



MERINO RAM.

adapted to the growth of wheat and maize; that the clayey soil lying upon the sandstone is stiff and difficult to till, and that the intermediate soils, resting upon mixed formations, are not very productive without the application of manure. The hills and plains of this region, which are destitute of aromatic plants, afford the finest of pasturage to numerous herds of sheep, cows, and horses, the latter two of which are fed on hay during the winter months, a very rare circumstance to occur in any part of Spain or the south of Europe generally. The other instance referred to is the territory adjacent to the town of Molina, in Arragon, which abounds in aromatic and odoriferous plants, and is celebrated for its good pasturage and fine flocks, yet their wool is of no better quality than that of the sheep of Montana, where no aromatic plants are to be found. The hills and mountains about Molina are composed of red and grey sandstone, limestone, gypsum of various colors and stages of decomposition, dark and light-colored granite, intersected by numerous veins of lead, iron, and copper, the latter of which contains silver, sulphur, and arsenic; and all the surrounding country is rich in springs, from which large quantities of salt are annually made. Without digressing further from the subject, it may not be improper to state that the pastures of Spain are generally prolific in sweet grasses suitable for grazing, several of which are indigenous; and others have been introduced from northern Africa, the East, and other parts of Europe.

"That the quality of wool depends much upon climate there can be no doubt, for it is a well established law that the wool of sheep, in the torrid zone, degenerates into a species of hair; and in very cold, rigid ones, though fine near the roots, it becomes coarse toward the ends. Hence, it is only in temperate latitudes where wool approaches to a state of perfection; and its fineness in the Merinos, doubtless, is owing, in a great measure, to their being able to pass their lives in the open air, free from the extremes of heat,

cold, and moisture, common to some countries, and where their unobstructed but less abundant perspiration is allowed to be swept away as fast as it flows. It is a remarkable fact, that all the sheep in Spain, which constantly live in the open air, perpetuate their color and other properties to their progeny; and it is equally remarkable that the swine of that country, which run wild in the woods, are invariably clothed in fine, curly, black hair; and hence the Spanish proverb, 'Never did a Spanish hog's bristle pierce a shoe.'

"*Classification of the sheep, and laws regulating the flocks.*—The fine wooled flocks of Spain, in the language of that country, are called 'trashumantes,' or traveling sheep, in contradistinction to the 'estantes,' or those which are stationary. The former, let it be recollected, migrate every spring from the warm plains and valleys of the south, to the cool, mountainous regions of the north, where they pass the summer, and return again in autumn to pass the winter below. It is obvious that migrations of so frequent occurrence, and to so great an extent, would necessarily require some fixed regulations. Hence, a great number of ordinances, penal laws, privileges, and immunities were enacted, or so set forth in different reigns, for the preservation and special government of these sheep; and hence the origin of the ruinous privileges of the 'mesta.' This was an association of proprietors of large flocks, consisting of rich, religious communities, grandees of Spain, and opulent individuals with hereditary rights, who fed their sheep at public expense during every season of the year, which eventually gave rise to a custom first established by necessity. The mountains of Saria and Segovia, condemned to sterility by the climate, soil, and the steepness of their sides, were formerly the asylum of some neighboring flocks. At the approach of winter the place was no longer tenable. The sheep sought in the neighboring plains more temperate air. Their masters soon changed this permission into a right, and

united themselves into an association which, in time, became augmented by the addition of others who, having obtained flocks, were desirous of enjoying the same privileges. The theater was extended in proportion as the actors became more numerous; and, by degrees, the periodical excursions of the flocks were extended to the plains of Estremadura, where the climate was more temperate and pasturage plenty.

"The mesta requires the parts of the country where the sheep are pastured to be set off in divisions, separated from each other only by landmarks—fences, or other kinds of enclosure, being deemed unnecessary, as the flocks are constantly attended by shepherds and dogs. Each of these divisions is called a 'dehesa,' and must be of a size capable of maintaining about one thousand sheep in the grazing stations of the north, and a greater number in those of the south, where the lambs are yeaned and reared. Every proprietor must possess as many dehesas in each province as will maintain his flock, which, in the aggregate, is called a 'cavana,' and is divided into as many subdivisions, or tribes, as there are thousands of sheep contained in it. Each cavana is governed by an officer called 'mayoral,' or chief shepherd. For each subdivision of a thousand sheep there is allowed five under shepherds and five dogs. The chief shepherd is required to be the owner of four or five hundred sheep, must be strong, active, vigilant, intelligent, and well skilled in everything that relates to his flock. He has absolute control over fifty shepherds and as many dogs, whom he chooses, chastises, or discharges at will. Some of the inferior shepherds assume the title of 'rabadan,' or 'zagal,' whose duty it is to exercise a general superintendence over his tribe, under the direction of the mayoral; also to prescribe and administer medicines to the sick and maimed. At the period of travailing, and when the ewes are giving birth to their young, two or more extra hands are allowed to every tribe; and in time of shearing one

hundred and twenty-five shearers are required to a flock of ten thousand sheep.

"On the propriety of law and order in conducting these flocks there can be no doubt, but great exception is made to several enactments in force, and a continued struggle has long existed between the company of the mesta on one part, and the lovers of public good on the other. No land that has once been occupied for grazing can be tilled before it is offered to the mesta at a certain rate. Long green roads, leading from one district to another, at least two hundred and fifty feet wide, are required to be kept open, as well as extensive resting places, where the sheep are fed and sheared. So rigid is the law on this point, that, during the periods of migration, no person, not even a foot passenger, is allowed to travel on these roads, unless he belongs to a flock. These passages must unavoidedly cross many cultivated spots, such as corn-fields, vineyards, olive orchards, and pasture lands common to towns, the evils and inconveniences of which are obvious and need no comment. All questions and difficulties between the shepherds and the occupants of the lands through which the roads are suffered to pass are decided by special courts that perform a kind of circuit, and sit at stated periods to hear and decide.

"*The Shepherds*—The salary of the chief shepherd does not exceed two hundred dollars a year and a horse; that of the first under-shepherd of a tribe, ten dollars a year; the second, seven dollars; the third, five; the fourth, three; and the fifth, a boy, two dollars a year. The ration of each is two pounds of bread a day, with the privilege of keeping a few goats in the flock for their milk. They are also entitled to the skins and carcasses of the culled sheep and lambs, and each receives from the chief shepherd a 'regalito' of three-fourths of a dollar in April and October, and these are all the sweets that these poor wretches enjoy, with the exception of about a month in a year, which each takes in his turn, to visit his family or friends. They are exposed

the rest of the time to all the vicissitudes of the weather, and at night have to lie in miserable huts formed of stakes, brambles or branches of trees, and often sleep, as they term it, *de abaxo las estrellas*—under the stars.

"*Mode of giving Salt to the Sheep.*—The first thing the shepherd does when his flock returns from the south to their summer downs, or pastures, is to give them as much salt as they will eat. Every owner allows to each tribe of a thousand sheep twenty-five quintals of salt, (2,500 pounds,) which they consume in about five months. They eat none in their journeys, nor are they allowed any in winter, for it is a prevailing opinion that it produces abortion when given to ewes forward with young. This has ever been the custom, and is thought to be the true reason why the kings of Spain could never raise the price of salt to the height it has maintained in most parts of France; for it would tempt the shepherds to stint the sheep, which, it is believed, would weaken their constitutions and deteriorate their wool. The shepherd places fifty or sixty flat stones at the distance of about five paces apart, strews salt upon each, leads the sheep slowly among them, and every one is allowed to eat of it at pleasure. But when they are feeding on limestone land, whether it be on the grass of the downs, or on the little plants of the corn-fields after harvest-home, they eat no salt; and if they meet a spot of a mixed formation, they are said to partake of it in proportion as the soil is mingled with clay. The shepherd being aware that his sheep will suffer if deprived of salt, leads them to a clayey soil, and, in a quarter of an hour's feeding, they march to the stones and devour whatever they need.

"*Caution in allowing the Sheep to imbibe Frost or Snow.*—One of the shepherd's chief cares is not to suffer his sheep to imbibe, in the morning, the frozen dew or melted frost, and never to approach a pond or stream after a shower of hail. For, if they should eat the dewy grass, or drink the melted hail, the whole tribe, it is believed, would become

depressed in spirits, lose their appetites, pine away, and die, as often has happened. Hail water is also so pernicious to man, in that climate, that the people have learned, by experience, not to drink from a rivulet or stream until some time after a violent storm of hail.

"*Disposal of the Males.*—On the last of July, six or seven rams are permitted to run with every hundred ewes, and when the shepherd judges they are properly served, he collects the former into a separate tribe, to feed by themselves. There is also another tribe of rams, which feed apart, and never serve the ewes at all, but are merely kept for the butchery, or for their wool. Although the wool and flesh of wethers are finer and more delicate than those of rams, the fleeces of the latter weigh more, and the animals are longer lived. The longevity of the sheep also depends upon the perfection of their teeth, for, when these fail, they cannot bite the grass, and are condemned to the knife. The teeth of the ewes, from their tender constitution and the fatigues of breeding, usually begin to fail at the age of five years—the wethers at six—and the robust rams not until they are nearly eight years of age.

"*Smearing the Sheep.*—Towards the close of September the shepherd performs the operation of smearing the sheep with a heavy, irony earth, common in Spain. It is first mixed with water, and then daubed on their backs, from the neck to the rump. Some say it mingles with the oil of the wool, and thus becomes a varnish impenetrable to the cold and rain; others, that its weight keeps the wool down, and prevents it from growing long and coarse; and a third class, that it acts as an absorbent, and receives a part of the perspiration, which would otherwise foul the wool and render it rough. Be this as it may, it is a custom of long standing, and probably is useful both to the fleece and to the animal which carries it, and answers the purpose of destroying vermin.

"*Return of the Sheep to Winter Quarters.*—At the end of

September the sheep commence their journeys towards the lower plains, their itineraries being marked out by immemorial custom, and are as well regulated as a march of troops. Each tribe is usually led by six tame wethers, called 'mausos,' which are obedient to the voices of the shepherds, who frequently give them small pieces of bread to encourage them along. The sheep feed freely in all the wilds and commons through which they pass, and often the poor creatures travel fifteen or twenty miles a day through the crowded lanes to get into the open wilds, where the shepherd walks slow to let them feed at ease and rest; but they never stop, have no day of repose, and march two or three leagues a day, ever following the shepherd, always feeding or seeking with their heads toward the ground, till they arrive at their journey's end. The chief shepherd is cautious to see that each tribe is conducted to the same district in which it fed the winter before, and where the sheep were yeaned, for it is thought to prevent a variation in the wool, though, indeed, this requires but little care, as it is a notorious truth that the sheep would go to that very spot of their own accord, although the distance is sometimes full one hundred and fifty leagues, which cannot be traveled in much less than forty days.

"The first thing to be done after the sheep return to their winter plains, is to prepare the 'toils' in which they are to pass their nights, lest they should stray away and fall into the jaws of the wolves. The 'rediles,' or toils, consist of enclosures of net-work, with meshes a foot in width, and of the thickness of the finger, made of a species of rush called 'esparto' (*Lygeum Spartum.*) This plant is also much used in the south of France and Spain for making ropes, mats, baskets, etc., and was also employed for similar purposes by the ancient Romans.

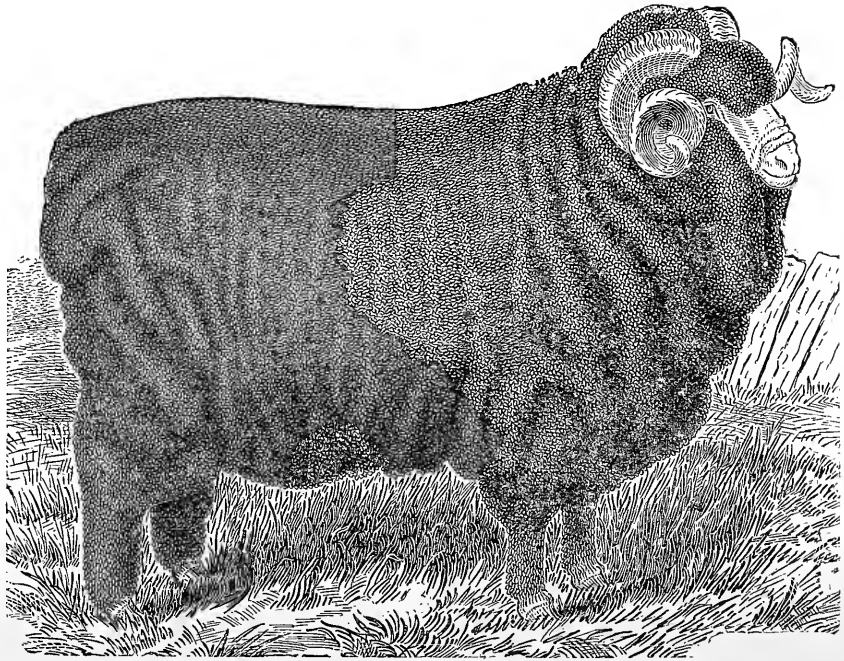
"*Yeaning and Management of the Lambs.*—About the end of December the ewes begin to bring forth their young, which is the most toilsome and the most solicitous period of

the pastoral life. The shepherds first separate the pregnant from the barren ewes, and conduct them to the best shelter, and the others to the bleaker parts of the district. As the lambs are yeaned, they are led apart with their dams to a more comfortable place. A third division is made of the lambs last brought forth, for which was allotted from the beginning the most fertile spot, of the sweetest feed, and the best shelter, in order that they may grow with as much vigor as those first yeaned; for they must all set off the same day in spring towards their summer quarters.

"It is the interest of a proprietor to increase his flock to as large a number as the land allotted to it can possibly maintain; in consequence of which the sheep are always low kept. When a flock has arrived at that point, all further increase is useless, as there is but little sale for these sheep, unless some neighboring cavana has been reduced by mortality. Hence most of the lambs are killed as soon as they are yeaned, and each of those preserved is allowed to suck two or three ewes.

"In the month of March the shepherds perform four operations on the lambs about the same time. They first cut off their tails five inches below the rump, in order to preserve cleanliness; they next brand them on the nose with a hot iron, making a permanent mark or character indicating the flock to which they belong; and then saw off a portion of their horns to prevent the rams from hurting one another, or the ewes. The fourth operation is to render impotent the lambs destined for docile bell-wethers, to walk at the head of each tribe. This is not done by making an incision, as with us, but by turning the testicles with the fingers twenty times round in the scrotum, twisting the spermatic cords as a rope, and the parts wither away without danger.

"*Migration of the Sheep to their Summer Retreats.*—As soon as the month of April arrives, which is the period of departure from the winter to the summer quarters, the sheep manifest, by various uneasy motions, a remarkable restless-



MERINO RAM. Owned by E. N. Bissell, East Shoreham, Vermont.

ness and a strong desire to be off. At this time, it is necessary that the utmost vigilance should be exercised, lest the sheep should escape, as it has often happened that a tribe has stolen a forced march of three or four leagues upon a sleepy shepherd; but he is sure to find them by pursuing the same road over which they came the autumn before, and there are numerous instances of three or four strayed sheep walking a hundred leagues to the very pastures where they fed the preceding year. Thus they all go off towards their summer retreats in the same order as they came, only with this difference—the flocks which migrate to Old Castile are shorn on the road, and those which go to Arragon are shorn at their journey's end.

"*Shearing of the Sheep.*—The season for sheep-shearing in Spain, like the harvest and the vintage in corn and wine countries, is a time of great festivity and rejoicing, both to the proprietor and the workmen. A multitude of shearers, washers, and other attendants are fed upon the flesh of the culled sheep, and it would seem that the slaughter occasioned by this season of feasting would be sufficient to consume the whole flock.

"The operation of shearing commences on the first of May, provided the weather be fair; for if the wool be not quite dry, the fleeces, which are closely piled upon one another as soon as they are taken off, would ferment and rot. It is for this reason that the business is performed in large spacious buildings called 'esquileos,' which are usually so arranged as to receive entire flocks of twenty, forty, and even sixty thousand sheep, and, besides, the constitutions of the ewes are such that if they were exposed immediately after shearing to the air of a bleak, stormy night, they would all perish."

We have only mentioned Southdown, Cotswold and Merinos as the three most popular breeds in Tennessee. They and their produce constitute nine-tenths of the sheep in the

State outside of the common natives or scrubs. There are yet a few descendants of the Leicester, and some Shropshire Downs. The former are fast disappearing, and the latter have not proved as profitable with us as they have in England, or even in some of the Northern States. They resemble the Southdowns very much in appearance, with face and legs, larger carcass and heavier coats of wool of longer staple. Like most of the Downs families, they are good mutton sheep, but they are more ragged in form and do not fatten as quickly as the Southdowns. It is claimed however by the breeders of Shropshires that the increased weight of fleece more than compensates for the superior qualities of the Southdowns for mutton. As stated above, Shropshires have not proven sufficiently profitable in this State, as compared with the other breeds we have mentioned, although they have been in the hands of skillful and experienced breeders, to create a demand for them, either to breed as thoroughbreds or to cross upon the common sheep.

CHAPTER VIII.

CROSS BREEDS AND GRADES.

When it is desired to improve the standard of one's flock, or to change the breed altogether, the greatest care should be observed to procure rams of the breed wished, of the very choicest quality, regardless of the first cost. A Merino, or even a scrub sheep, may be converted into an almost pure-blooded Southdown or Cotswold by judicious management. A grown ram will serve from thirty to forty ewes in a season, if properly managed. A good Merino ram will add more than one pound of wool to the fleece of every lamb got by him from a common ewe. Here is 30 or 40 pounds of wool for the use of a ram for one season, to say nothing of the other valuable qualities, and every lamb subsequently got by him adds a pound to this amount. Many a ram gets during his life 800 to 1,000 lambs. This gives the breeder, in addition to the wool, from 800 to 1,000 half-blooded sheep, worth double their dams, and ready to be made the basis of another and higher stride in improvement.

Farmers frequently experiment in breeding for their own satisfaction by mixing or crossing two different varieties; this is done in attempting to establish a new breed or variety, or more often to supply some demand for a special quality of wool or mutton. The results of such experiments, if made with two varieties of thoroughbred sheep, are generally disastrous; there is no uniformity in a flock bred in this way, for the individuality, so to speak, of each breed that it has required a long number of years to establish, will be lost in the cross, and neither the rams nor the ewes of this cross-bred sheep will reproduce in their off-

spring with any degree of certainty, and to any extent the characteristic merits of either of their pure-bred ancestors.

To pursue a course of this kind, however, in breeding, for a long series of years, would ultimately result in a new breed of sheep of fixed type, and with the power of reproducing their likeness and quality in their offspring; but to establish a new breed with this power would almost require the work of a lifetime, unremitting skill, attention and patience, and with a well defined object constantly in view. To skill of this kind, and to the patient perseverance of breeders years ago, are we indebted for the excellent varieties of the present day, and in order to keep each of them up to the highest standard of excellence, it is absolutely necessary to keep them pure and free from other crosses.

GRADES.

While we doubt if there are any cross-bred sheep as good as either of the thoroughbreds from which they come, there can be no doubt as to the increased value of a flock resulting from a thoroughbred ram of any of the different established varieties crossed upon the common scrub ewes of the country.

Sheep bred in this way are called grades, and so marked and rapid is the improvement of the flock by using nothing but a thoroughbred ram on these grade ewes, that it is difficult to tell the grades from the thoroughbreds after they are two or three removes from the scrub. This rapid improvement in the flock is sometimes injurious to the farmer, by tempting him to select a young breeding ram from his flock of handsome grade lambs, expecting him to continue the improvement of the flock already begun by his thoroughbred sire, but the result of such breeding will in every instance prove a disappointment; a grade ram should never be used for breeding purposes, for under no circumstances can he increase the value of the flock, and his offspring will invariably deteriorate. Even if bred to thoroughbred ewes,

this will be the case, and although the inferiority of the produce may not be so marked as when bred to grade ewes, the result finally will be the same, and both will terminate in a scrub. A lot of thoroughbred ewes will degenerate into common scrawny scrubs by the constant use of grade rams upon them and their descendants more rapidly than the produce of scrub ewes can be bred up to full bloods by the constant use of thoroughbred rams. Hence we say, that the farmer, tempted by the extra fine appearance of a grade lamb, saves him for a breeder, and uses him on his ewes, does his flock an injury that will require a thoroughbred ram two years to deface.

For the general farmer the most economical way to begin a flock is to buy the common scrub ewes, and breed them up by using thoroughbred rams, being governed in the selection of a ram entirely by the special qualities desired in the flock.

In none of our domestic animals have we more complete power to breed at will such qualities as we want, than we have in sheep, and while it would take, as stated above, a long series of years to establish a typical breed, yet the lambs from grade ewes by thoroughbred rams often show as much quality as the thoroughbred, though they will not and cannot transmit this quality with any degree of certainty to their offspring, hence the necessity of using thoroughbred rams, it matters not what purpose the flock-master has in view, be it wool or mutton, or both combined.

If wool is the principal object, and a fine texture mostly desired, a Merino ram should be used; three or four crosses of Merino will not only give the desired texture, but will more than treble the weight of the fleece of the grades over that of the original scrub, and if the demand should change to a long combing wool, no better or more profitable cross could be made than by breeding these high grade Merino ewes to a Cotswold or Leicester ram, this will produce a most desirable quality of wool that commands a good price

in any market, for it has the fine texture of the Merino with the combing qualities of the Cotswold. This is also a valuable grade for any pnrpose, producing a superior quality of wool, and at the same time making a juicy mutton, second in quality only to the Southdown grades.

Satisfactory experiments have been made with this cross by Capt. Thos. Gibson, of Maury county, an experienced and extensive breeder. He used, however, pure Merino ewes instead of grades; so gratifying was the result that he intends to cross his flock more extensively. Merinos are the oldest established breed of sheep we have, and their powers of transmitting their characteristics are greater than that of any other breed, hence when this breed is crossed with another the produce will carry the Merino type more distinctly than that of its other ancestor; thus if Cotswold rams are bred to only half-breed or three-quarter-bred Merino ewes, the wool will show by increased length the Cotswold blood, but it will also retain much of the fine texture of the Merino.

The well-known longevity of the Merino, their thrift and disposition to flock in large numbers without danger of disease, more common to the other varieties, make their blood a very desirable strain to have as a foundation stone upon which to build a flock for any purpose. Grade ewes of this breed are good and trustworthy breeders at eight years, and at that age, when it is no longer profitable to keep them as breeders, they fatten kindly and quickly for the butcher. We do not know of any grade sheep that will pay in wool more surely the average farmer, than high grade Merino ewes crossed twice or three times with a pure Cotswold ram.

Wool, however, is not always the greatest consideration in sheep husbandry. A farmer conveniently located to a market will find early lambs and fall mutton will pay better than his wool clip. With this object in view, a ram should be selected from that breed most noted for its mutton qualities. Early maturity must be duly considered in

making a selection, as the sale of early lambs will be the greatest source of profit to the mutton breeder. The Southdown are, beyond all question, the best mutton sheep we have; they are close to the ground, on short legs, square-bodied; marble their flesh well, and take on flesh rapidly. As a breed, they will dress more neat meat, in proportion to offal, than any of the varieties above mentioned; hence, in selecting a ram to grade up the scrub ewes, select a Southdown. So much depends upon contingencies, such as location, pasturage, markets, etc., that no definite plan can be given as best, under all circumstances, for breeding the mutton sheep.

In selecting the scrub ewes, with which it is presumed the breeder will first start, the first and greatest care should be to get healthy ones, free from all the many diseases so common amongst scrub sheep. None of them should exceed three years old, for scrub ewes are by no means certain breeders after passing five years. The health and age of a ewe being satisfactory, her shape and condition should be next considered. These two points we place last, though they are more often the first considered by the purchaser in making his selections. That health and age should be first considered, is at once apparent, for one unsound or diseased ewe can quickly disease the entire flock, and it is never safe to count on getting more than one lamb from a five-year-old ewe.

In shape, the ewes selected for breeders should be compactly built, square, and wide behind, good stout frames, of medium size, a lengthy body on short legs, and, last of all, they should be as well wooled as can be found after the other points have been considered; for, remember, mutton is the principal object now, and breeding ewes should not be expected to yield more than wool enough to pay for their winter keep. Ewes selected in this way, even though they are scrubs, will present something of a uniform appearance, and this uniformity will greatly assist the breeder in select-

ing a ram of the proper form, and one that will most likely produce the best results when mated with them.

The ram should be well developed where the ewes are most defective. If they are light and contracted in front, he should have full, strong shoulders, and depth in the brisket; if they are flat-ribbed and leggy, his ribs should be well arched and his legs short; if they are naked under the belly, flank and thighs, he should be well wooled on those places.

But, as mentioned above, this is an after consideration in mutton sheep. It is not the largest carcass always that dresses the greatest number of pounds of neat meat, or that proves the most profitable to the breeder; on the contrary, medium-sized sheep are more desirable. They are, as a general thing, more compact in form, not so coarse in appearance, fatten more rapidly, and when brought to the butcher will command a better average price than a ragged and uneven lot of larger ones. There are times, however, when it is advisable to use a large-framed and somewhat coarse ram to breed from. Such a one, for instance, would produce the best results crossed upon small and delicate ewes. Such a cross would be apt to give size and constitution to the lambs, with, however, more or less the coarseness of their sire; but this objection can be overcome by using upon these young ewes a ram of finer finish than their sire. Southdowns are deservedly the most popular sheep to breed for mutton. They are round and compact in form, mature early, and have the greatest tendency to take on fat. They will dress as much, and probably more, neat meat, in proportion to gross weight, than any other breed, hence they command the best price from the butcher, either as lambs or mutton.

Much depends, however, upon the location of the breeder as to what particular quality of sheep will pay him best. In breeding a grade flock for mutton, it does not necessarily follow that the fleece should be neglected. In some sections

it will pay best to breed nothing but thoroughbred Southdowns for mutton, for the breeder will frequently be enabled to dispose of a large number of his lambs to farmers and others as breeding rams to cross upon their common ewes.

In breeding for mutton, early lambs for market are generally the first consideration; though every year, after he gets fairly started, the flock-master will find old ewes and uncertain breeders accumulating on his hands, that will best pay him in the butcher's pen. They can be replaced by a corresponding number of young ewes, selected each year from the crop of lambs and reserved for breeding purposes. In this way he can always regulate the size of his flock, and at the same time have nothing but young, vigorous ewes for breeding.

We have mentioned elsewhere how mutton sheep should be treated, but it will not be out of place here to say that the ewes intended for the shambles should be kept apart from the flock, for they require more food, and of a richer quality, than breeding ewes should have, and not being bred, they will constantly be in heat during the fall, and it would have a tendency to make young ewes abort if they were permitted to run with them.

The earlier the lambs come in market, the higher the price they will command. In the large eastern cities the butchers dispose readily of all the extra early lambs they can get at fifty cents per pound dressed meat. In order to get the best prices, the ewes must be bred early. Probably the best time to buy the scrub ewes with which to start the flock on, would be in June or July, after they have been clipped and before they have been bred. In order to get good prices for the lambs, these ewes should be bred at the earliest moment possible, the last of July or first of August, if they will take the buck; and it is quite important that they should be bred in bunches of 20 or 25, as nearly at the same time as possible, in order that the lambs

may come as near together as possible. No one who is not familiar with the business can realize how much is added to the appearance of a flock by having them all of uniform size, or how eagerly a butcher will take a smooth, even lot of lambs in preference to a ragged lot, even though the latter be larger. We have stated that the Southdowns are pre-eminently the best mutton sheep we have, and where mutton alone is desired, it is useless to hunt further than a Southdown for a ram to breed upon these scrub ewes. But there are other considerations, important to the breeder just beginning to grade up his flock, in addition to their mutton qualities, even if mutton is his principal object. He wants long-lived and healthy ewes, and he wants them to yield him as much wool each year as possible without detracting from their value as mutton. Remember, we are speaking of a grade flock now, with no thoroughbreds except the rams that are used. As mentioned above, no better cross can be first used on the common ewes, it matters not what quality is most desired, than a Merino ram. It will add from one to two pounds of wool to each lamb, and will give a healthy and thrifty flock of half-breed ewes to breed from. With these to start on, it is an easy and pleasant task to shape the flock as desired. If a longer staple and a heavier fleece and a larger carcass are desired, then a Cotswold ram should be used until the desired standard is reached; if, on the other hand, mutton is the object, use a Southdown ram on the half-breed Merino ewes. Either of these objects, wool or mutton, can be bred on a flock quicker by using direct on the scrub ewes a ram of either of the breeds mentioned, but in doing this we would get the hardy and valuable blood of the Merino, a cross that would certainly be of benefit to every grade flock in the State. A most valuable and desirable grade sheep, and one that comes probably nearer than any other filling all the requirements of the average farmer, is to breed the half-bred Merino ewes in twice to a Cotswold ram, and then on the ewes from

these three crosses, breed a Southdown ram. In the first cross with the Merino we get more fleece of finer quality, a long-lived, healthy sheep. Such ewes, bred to a Cotswold, will nearly double the weight of fleece, giving it more length, and at the same time increasing greatly the size of carcass. Breed these Cotswold-Merino ewes to a Cotswold ram again, and the produce will approach very near a full blood Cotswold in size and appearance. The fleece will not be quite as long or heavy as the Cotswold, but it will be of finer texture, owing to the Merino cross. The ewes can be counted as valuable breeders at seven or eight years of age, and will, in their prime, average a clip of eight pounds of wool. The breeder can keep his flock up to this standard by using every third year a Merino ram on the ewes. The sale of early lambs, however, will be the chief source of revenue to him, and in order to realize the best prices, a Southdown ram should be used for the sire of the market lambs.

The effect of breeding a Southdown ram on these Cotswold-Merino ewes will be of no advantage to the fleece of the offspring; on the contrary, it will have a tendency to decrease the weight and length; but the change in this respect, is scarcely perceptible, and the advantages arising from this cross for mutton more than compensate for the loss in wool. The lambs from the Southdown ram will be of more compact form, mature earlier, and take on fat more readily than the Cotswold-Merino lambs. Ninety per cent of them will have the distinguishing marks of the Southdown, in brown faces and legs. This adds nothing to their real value as mutton, but it assists the breeder very materially in disposing of them at the highest market price. This will be more readily understood by those who have experience in selling lambs, and know the very decided preference butchers give lambs that show their Southdown origin in black or brown faces and legs. Aside from the advantages mentioned above, a grade flock bred in this

way are, owing to the constant infusion of fresh blood necessary to keep up the proper standard of the flock, remarkably healthy and vigorous.

The relative value of cross-bred sheep is shown conspicuously in the following table, the result of an experiment with some of the most productive and highly esteemed of the established breeds of improved sheep, though it does not include Merinos, and the animals were thoroughbred instead of grades. The Cotswold being the largest, was the basis of comparison, the number kept being proportioned to relative size:

Breeds of Sheep.	Comparative No. Kept.	Weight of Fleece.	Value of Fleece.	Weight of Carcass at 14 mo. old.	Total Products.
		Lbs.	*Cents.*	*Lbs.*	*Dollars.*
Cotswold	100	5 to 10	31 to 32	80	1,241 66
Leicester	105	4 to 8	31 to 33½	68	1,113 18
Hampshire Downs	115	3 to 7	31 to 36	68	1,020 62
South Downs	120	2 to 6	33 to 37	60	1,317 70
Cross-bred	115	4 to 8	33 to 36	76	1,464 50

This certainly makes a fair showing for the cross-breeds.

Interesting Experiment in Austria of the Crossing of the Cotswold upon the Merino, on Exhibition at the Vienna Exposition.—"The Merino element is so prominent in Austria that the growing necessity for better mutton is beginning to be met rather by cross-breeds than mutton sheep of full blood. The Cotswold-Merinos on exhibition commanded much attention. They are without horns, have the white faces of Cotswolds, and the pink noses of Merinos. They are of good size, with a girth of nearly six feet over the wool. The fleeces, at eleven months, showed fibre 4½ inches long; much longer than the Rambouillet, finer than that of the Cotswold, with much of its lustre, and a fair degree of the curl of the Merino, without its dirt and grease.

"The union of Cotswold and Merino blood on the Keltschan Sugar Company's estate in Moravia, has been more satisfactory in its results than any contemporary experience in cross-breeding. The change was effected by the use of

imported Cotswold rams. The large area occupied, exceeding 6,000 acres, is hilly, and the pastures are covered with fruit trees, suggesting sheep as the stock most appropriate to be kept. The old flock of fine wools was not profitable, the culls being almost worthless for mutton, upon which the rich beet pulp was practically thrown away in an attempt to fatten them. The experiment was successful above expectation. The cross-breeds were thrifty, early attaining maturity, becoming fat at ten or twelve months old. After weaning, the lambs are fed upon beet pulp, have a little rape-seed cake, and oats, until a supply of mown clover is attainable, and later are pushed forward with mangolds. With such a course of feeding, they weigh 140 pounds or more at 12 or 14 months, and have brought at market an equivalent of 7 cents per pound, live weight, or $10 per head. After the first cross, it has been found best to breed in-and-in by selection from the same flock. A second flock was constituted with reference to very large size and great hardiness, by selecting large native ewes from the Carpathian Mountains (Zackels), and also Merinos of unusual size, and coupling with rams of any breed having requisite size and constitution. The offspring of these selected sheep were paired with Cotswold males from England, and their progeny inbred without further crossing. The result is the Keltschan sheep exhibited by the sugar company—a large animal, an average wether weighing fully 170 pounds at 14 months, and 225 at 18.

"This company has also a Southdown flock, and a cross-breed, or a Southdown-Merino flock, the latter well adapted to medium lands, but surpassed by the Cotswold-Merinos for rich lands, and by the heavy Keltschan sheep for profit as pulp-eaters and flesh-makers. The weight of fleeces of the Cotswold cross is fully four pounds, and of the others three pounds."

CHAPTER IX.

WASHING, SHEARING AND PACKING WOOL FOR MARKET.

Our Northern friends almost universally pursue a plan that has never come into use with us, and that is, washing sheep before shearing. This custom prevails also in England, and in fact throughout all European countries. It has been practiced time out of mind, and what is so popular with them certainly has merits. It frees the fleece from dirt, and many impurities that accumulate during the year. It causes the wool to sell at a higher price also, and I see no reason why it should not be practiced here.

Soft water should be used in preference to hard water. Streams with sandy, or what is better, gravelly bottoms, must be selected, and about waist deep. If the stream has a muddy bottom the soil will adhere to the wool, making it worse than before. Many persons purposely select a bed of mud, and incorporate as much as possible in the wool, so as to add to the weight of the fleece. But this is a poor method of cheating, and will be readily detected by the buyer, who, awake to his own interest, will dock the value more than sufficient to overbalance the addition. Soft water leaves the wool, when dry, soft and pleasant to the feel, as it does not deprive the wool of its grease or yolk-like water that has lime in it, which leaves the wool rough and harsh to the fingers.

The stream being agreed on, a pen is built on its banks into which the sheep are driven. The pen has a narrow alley leading down to the water, and ending in a small platform, from which the sheep are plunged directly into the water. The washer should be careful not to handle the sheep by the wool, as it impaires the wool and skin, often

producing extravasation of blood under the skin that causes the wool to shed at that point. He should grasp him by the legs and plunge the sheep under two or three times until he is thoroughly wet, then allowing him to stand on his legs, the wool is rubbed, the matted parts opened, and the legs washed free of dung, as near as may be, without keeping the sheep in too long. The sheep should then be passed to another washer, who stands above him, and well rinsed, and then turned into a clean, grassy meadow, squeezing as much water out of the wool as possible. Ewes not having given birth to their lambs should be more carefully handled than the others, but if carefully washed, no harm will result. Good hands will wash about one sheep to every minute, if sufficient help is given in passing them down. After washing they should be kept in a clean meadow to prevent the adherence of dirt until the wool dries, which will be according to the weather, in five or seven days. Some people erect a dam across a small stream or branch, and conduct the water through a race three or four feet long to a platform or bridge, and with a pen on one side for the sheep, they can be washed without the necessity of standing in water, and with a gum apron and boots the washer will be able to keep perfectly dry.

Shearing.—When the sheep has got not only perfectly dry, but when the yolk that has been washed out has had time to re-form, making the fleece feel soft and mellow, it is then ready for shearing. This should be done as the washing is, by careful, gentle hands, and no violence should be shown the sheep, which is an exceedingly timid animal. The shearer should be provided with a good sharp pair of shears and a good whetstone, as the condition of the instrument greatly expedites the operation. He should also have a bench with legs about waist high, to relieve himself from the tedium of a long continued forced posture.

A good, warm, bright day should be selected, and not as is too often the case, wait for a rainy day when nothing can

be done out of doors. The bench on which the sheep are laid should be planed smooth to prevent injury to the fleece or sheep, and if possible, they should be sheared on a barn floor, the latter being beforehand swept clean of straw or dust, as otherwise much filth will adhere to the wool, affecting its quality. Nothing contributes more to the sale of wool, as well as of all other farm products, than neatness in packing up. Shearing should take place, in Tennessee, about the middle of May, or later if the warm weather is backward in coming. If shorn in cold weather the sheep will shiver in the cold, and take many lung diseases. When every thing is ready the shearer, with his assistants, will place the sheep on the bench, and place the head of the sheep towards the shearer, the sheep resting on the right side. Begin by cutting all the tags off the fore leg and belly and neck. Let them be thrown on the floor and carried in a basket to one side out of the way, by no means allowing them to get mixed with the wool. Cut with the hand elevated, so as to keep the point next the skin, along the sides of the sheep's belly, fore leg, and over the backbone, as far as can be reached with the shears, then around the hind leg, tail, to the former cut. The sheep is now turned over on the shorn side, and soon divested of his coat by beginning at the same point and meeting the first cut. Bear in mind all the time to keep the hand well away from the sheep's body, and never by any means take two cuts at the same length of fibre. If the fibre is cut it is injured. Therefore if a farmer wishes to know whether a sheep is well shorn, he should not only look at the sheep, as many smoothly shorn sheep are badly shorn, but look at the inside of the fleece, and see if there are any short pieces of wool. Should the skeep's skin be cut with the shears, as it will be sometimes unavoidably, put a little tar over the wound, or fly's eggs will be deposited in it, and the place will soon be swarming with maggots.

Packing the Fleece.—The manner in which the fleece is

packed has so much to do with its sale, we deem it necessary to call the attention of farmers to the subject, and give a few short directions about it. Nothing, as already said, hastens or contributes more to the sale of wool than the neat manner in which it may be put up. I have seen wool purchased in large quantities in our State, and with very few exceptions have never seen it neatly packed. A neat roll of wool, properly tied up, will at once catch the eye of the purchaser, who will always select wool of this character to those rough, loosely hanging bundles, or no bundles at all, in which for the most part it is carried to market. As little as one would suppose, a difference of from four to five, and even six cents per pound is paid for the trouble. In Ohio the principal wool-growing State of the Union, much care is exhibited in preparing, sorting and tagging wool, and a great emulation exists among farmers as to who shall have the nicest packages of wool. The consequence of this care a reference to the prices current will show. The Ohio, Pennsylvania and West Virginia wools sell in the Philadelphia market at 50 to 52c, while the wools of New York and the other Western States sell at from 45 to 48 cents. This difference is due entirely to the extra care taken by the farmers of those States in preparing their wools for market, as they are graded the same in other respects.

We will suppose it has been well trimmed of tags. Lay the fleece on a table with the inside down, then turn the ends all in, such as the neck and legs, making the two ends, that are to be, a straight line, then roll up moderately tigh only, and tie with good twine, not too large, and the bundle is complete. In this shape it can be easily handled and and readily examined, and presents generally a neat appearance. Many expensive contrivances are made to give the fleeces a uniform shape, but unless a farmer handles many hundreds of fleeces, it would hardly pay expenses to provide all these appliances.

Should the farmer wish to ship the wool, it will be

further necessary to place the bundles in a bag or box, securely fastened. It is essential to pack it in as small a compass as possible, as the railroads charge by bulk and not by weight. The best plan to do this is to place a bag that is to be used under a trap-door of the barn, and while one man will get into the sack with bare feet, another will hand to him the bundles, which he will tread firmly into place with his feet and knees, when nearly full cramming the tags, which have been prepared, into the corners and odd places, until the bag is full. Let it then be securely sewed up, stuffing some tags in the corners to give a hand hold by which the bag may be moved about.

To prepare the tags for market, first dip them repeatedly in strong salt and water made hot as the hands can bear it, then wash out in soapsuds, pulling to pieces until all filth is removed, and then rinsing in rain or soft water. They will thus be made into very fair wool, while otherwise they would be worthless.

After the bag is sewed up, weigh it carefully, and mark the weight, name and quality on it.

This particularity of impressing so much care upon the farmer in packing and shearing may be understood when it is stated that every fleece of wool sheared from a sheep, when it reaches the last purchaser before the manufacturer, has to be sorted. The manufacturer buys only the sorts of wool he wishes to use in the fabrics manufactured. Some wish to convert it in jeans, some broadcloth, while others use only the finer qualities for ladies' dresses. In fact every fleece goes into some eight or ten grades. It may therefore seem a light thing to pack properly, but now that the fleece is opened, if it is all in a tangle, it can readily be seen how difficult it becomes to properly sort it, while the well-packed fleece flies with great rapidity into its proper heap under the judgment of the sorter. He is generally a high-priced workman, and his work goes on much faster with a trim fleece than with a slovenly one, and therefore the purchaser

can readily afford to give a better price for it. The wool of the world amounts to 1,800,000,000 pounds, and when we consider the vast numbers of persons concerned in preparing this enormous amount for the wear and tear of man, we can form some idea of its commercial importance. It has first to be raised by the farmer, sheared, and the fleece sent to market. Usually it passes into the hands of three or four tradesman before it reaches the manufacturer. All these middle men are given employment, and the farmer too derives part of his living from it. After it goes to the factory it is there scoured, dyed, oiled, plucked, carded, combed, broke, drawn, roved, spun, reeled, woven, all these different processes employing many thousands of laborers, and supporting their families. It has then to pass through the hands of the jobber, the wholesale and retail merchants, and at last comes back to the very man who sheared it from the sheep's back. But how different it is then. The rough, homely jeans or linsey has the same parentage with the glossy cloth or cassimere. The hod carrier gets his woolen jacket from the same source with the belle in her high-sounding and beautiful delaines. All these differences are the result of sorting. The perfection of its manufacture, and the wonderful differences in the fabrics cannot better be realized than by the fact that in ordinary spinning one pound of wool usually stretches to three-fourths of a mile, in superfine spinning it stretches to 22 miles; while the very finest and choicest bits of wool will reach a distance of 95 miles to a pound. Of this finest quality 1,500 fibres laid side by side will cover one inch, and a compact bundle of one square inch will require 2,225,000 fibres. By these statements one can readily see the importance of not injuring a single fibre of wool, and in fact the necessity of the great care prescribed in these pages for the improvement rather than deterioration of a staple that not only clothes the farmer, but gives employment to so many of the inhabtants of our sphere.

There is one fact in regard to the effect of shearing more curious than practical. It is asserted, on the best English authority, that rams recently sheared are incapable of producing lambs. From the fact that shearing always take place in the spring of the year. This, if true, is of no consequence, but it should be taken into account, should the farmer desire or intend to re-shear in the fall. According to a noted Australian writer, a flock of 4,000 ewes and 100 rams newly sheared, produced only 165 lambs. Another author had 100 ewes and four rams recently sheared which only brought nine lambs. A large "station" in the same neighborhood had five per cent. of lambs. In California they shear at any season, as in Australia, where the climate is equable, there being no sudden transitions of weather from hot to cold. Where there is a distinct division of heat and cold, the habit is universal to shear during the breeding season, otherwise the wool would shed and come off in tufts. With the exception of the Merino this is universal, but with the Merino, the sheep have been known to go as long as six years without shearing, which will account for the enormous weight of some published fleeces. One in Australia in six years attained a length of 22 inches, and one in California in 1874, with three years growth, weighed 52 pounds.

CHAPTER X.

DOGS.

The Thirty-ninth General Assembly of Tennessee enacted a dog law, greatly to the relief and satisfaction of the sheep-raisers throughout the State. Many farmers who had hitherto been deterred from raising sheep, soon engaged in the enterprise, and many more were preparing to do so, but before the good effects of the law were scarcely realized, the following Legislature (the 40th) repealed the law. It seems not a little extraordinary that two Legislatures, following each other so closely—giving them credit for an equal amount of intelligence and patriotism—should differ so widely in their appreciation of what constituted the true interests and wishes of their constituents. Both could not be right. We have the proof positive, through the answers received to the circulars issued by this department to all the principal sheep-raisers of the State, that they—for whose benefit and protection the law was enacted—regarded it as most salutary and beneficial. Why then repeal it? How did the members of the 40th General Assembly discover that the law was unpopular or not beneficial? The question resolves itself into this: Whether the hundreds of thousands of useless curs in the State shall be suffered to roam at large, to the injury and destruction of the property of others, or whether they shall be put under some restraint and control, that one of the most important industries of the State—I had almost said, the most important—might thrive and prosper?

The following table shows the salutary effect of the law during the short time it was in operation:

TOTAL NUMBER OF DOGS IN 1875.

	Bitches.	*Dogs.*
East Tennessee	2,258	49,567
Middle "	6,080	90,413
West "	4,412	63,087
	12,750	202,067
		12,750
Total in 1875		214,717
Total in 1876		182,530
Total decrease in dogs		32,187

The sheep interest was benefitted this much by the decrease. Did any other suffer in consequence? There might have been some obnoxious features in the dog law; if so, these could have easily been amended. The Supreme Court decided that the law was unconstitutional, that dogs were property and must be taxed like other property, and that a special tax could not be put upon them. It would seem that a remedy might be found to cover these objections. It certainly is not constitutional for a man, directly or indirectly, to destroy another man's property, or to exercise a privilege inconsistent with the freedom or privileges of others. Since it is legal now for any man to keep as many dogs as he pleases without paying a tax, there is a way in which our sheep-raisers can utilize this privilege. The Mexicans, who, by the way, are the very best shepherds in the world, and have immense flocks of sheep, that are exposed to a much greater enemy, if possible, than the dog—I mean the coyote, or prairie wolf—have no trouble in keeping them at bay by the following method: They select the young pups from some large breed of the common cur dog, and put them to sucking a ewe, first taking away her own lamb. At first she will rebel against the substitute, but from the natural desire to be relieved from her milk, she will permit them to suck her, and finally regard them with the same affection that she would her own offspring.

For the first few days they are allowed to suck only twice a day, morning and evening. After she becomes accustomed to them, they may be allowed to run together in a small enclosure. Finally, they are turned in with the whole flock, that they may get accustomed to them also, for no sheep will take to a strange dog at first, not even the finest-bred shepherd dogs. After the pups are weaned, they will never leave the particular flock they were raised among. No other dogs dare approach the flock, not even a strange person. If a pack of wolves come around the camp at night, the dogs keep up a continual barking, which frightens them off, so that a sheep is seldom destroyed by wolves. Three or four dogs are kept with a flock of 800 or 1,000 sheep. These dogs are much stronger and fiercer than the Scotch colley, and can be trained to the care and management of the sheep with equal skill and fidelity, while the cost is nothing but the time and trouble of rearing them. They will not require to be fed on meat; corn-dodgers and milk are quite sufficient for them.

This is a certain and most excellent way to break a shepherd dog; but one equally as effective for Tennessee breeders, and less troublesome, is to have the puppy accompany the flock-master whenever he goes about his sheep, say twice or thrice a day. The pup will soon become accustomed to them, and, with a little practice each time, the flock-master can soon make him drive a flock in any direction. These dogs have a natural instinct to drive stock of all kinds. This is as marked in the shepherd dog as hunting or standing birds is to the setter or pointer, and it only requires a little patience and care to make a pretty fair dog out of any thoroughbred puppy of this breed.

After all, if the sheep-raiser gives the proper care and attention to his sheep which they ought to have—and if he does not do so, he ought not to embark in the business—there is no necessity of his losing his sheep by dogs. Mr. Cockrill, who has a large flock within three or four miles

of Nashville, told the writer that he never lost any sheep by dogs. When asked how he avoided it, he replied that he always kept a shotgun ready, and whenever a dog came around his premises he killed him. His neighbors who had dogs, understood this, and kept them at home, and even the dogs themselves, he said, by a sort of instinctive perception of what would be their fate if they approached too near, concluded to keep away.

WHAT OUR CORRESPONDENTS SAY ABOUT DOGS—ANSWERS TO OUR CIRCULARS ON THE DOG QUESTION.

C. T. P. Jarnagin, Mossy Creek, Jefferson county: Any dogs killing sheep? Answer: Their name is legion. Dogs at a premium. We are afraid toraise sheep.

W. G. Ewin, Hurricane Mills, Hickman county: You might say all the dogs in the county. The repeal of the dog law deterred some from buying fine sheep and bringing them into the county.

J. A. Turley, Cog Hill, McMinn county: Yes! One hundred head killed in the upper edge of Bradley county last week, and a few killed in this vicinity every week.

T. J. Knox, Charleston, Bradley county: Seventy-five killed within five miles of this vicinity since the adjournment of the Legislature.

J. N. Guthrie, Gallatin, Sumner county: Since they—the dogs—have been freed by our Solons, sheep-killing is on the increase, and so are the dogs.

G. T. Allman, Cornersville: Twenty-five per cent of our sheep are destroyed by dogs, valued at $18,000.

W. Williams, Edgefield, Davidson county: Five to ten per cent. of the sheep in this county destroyed by dogs.

Jno. F. Hauser, Gruetli, Grundy county: About one-third of the whole number.

H. C. Williams, Marcella Falls, Lawrence county: One-tenth of the whole number killed by dogs.

A. B. Cummings, Jonesboro, Washington county: About one-half of the whole number.

M. L. Thomas, Sullivan county: One-fourth of the whole number.

J. T. Keith, Jackson, Madison county: Twenty per cent., both as to number and value.

N. B. Cheairs, Spring Hill, Maury county: $2,500 in value destroyed by dogs in our county.

J. K. J. Blackburn, Lynnville, Giles county: Very few were killed while the dog law was in force.

M. A. Hardin, Decatur, Meigs county: We had very few killed while the dog law was in operation.

Geo. W. Atchley, Decatur, Meigs county: From one-half to three-fourths of the entire amount of sheep.

Wm. C. Doughtenson, Waverly, Humphreys county: About ten per cent. destroyed by dogs.

J. S. Lindsay, Campbell county: Five hundred head destroyed, worth $1,500.

Elijah Dougherty, Johnson county: In the last three years but few, but previous to the dog law one-fourth were killed, including lambs. Sheep husbandry could be made very remunerative in this country if it were not for the dogs. I know no branch of industry that would pay so well. We have thousands of acres lying dormant, that would make the best sheep-walks, that cannot be utilized for any other purpose. Are we never to have any protection for the rearing of this useful animal?

Geo. T. Allman, Cornersville, Giles county: I think twenty per cent. of our sheep are annually killed by worthless dogs.

Lorenzo Stratton, Grassy Cove: Twenty per cent. of the sheep of this county are said to have been killed by dogs within the last thirty days.

J. A. Jones, Cannon county: A great many. The dogs commenced soon after the dog law was repealed.

Some of our sheep-raisers have adopted the plan of not permitting the freedmen employed by them on the farm to keep any dogs. They find it greatly reduces the number of worthless curs prowling around.

A most effectual method to stop the production of trifling dogs, and one that will inflict no injury on any one, is a law imposing a tax upon bitches. By the influence of such a law, the many worthless curs and mongrels would be destroyed, while good ones would be retained. The fear of popular favor, however, renders it extremely doubtful if any law protecting sheep from dogs will ever be enacted. It is strange, too, when the wool and meat of the sheep clothes and feeds a large portion of the human family, and the hair of the dog never clothed, nor his flesh never fed, any class but savages.

[From the New York "South."]

"The canine onslaught in the towns and cities, North and South, on account of the fear of the horrors of hydro-

phobia, is well calculated to re-awaken inquiry as to the cause, consistency and wisdom of the lenity shown in various sections of the country, to curs of various degrees. A late Tennessee correspondent of the Cincinnati Commercial makes a fair exhibit of the too prevalent folly in this regard. Tennessee has recently chosen to stand by the dog, instead of the sheep. And taking the population of the two States as a basis of comparison, this correspondent finds that there are nine dogs in Tennessee to one in Ohio. In Ohio there is but one dog to every twenty-seven people, and as for sheep, there are forty-six sheep in that State to one dog. The Ohio farmers annually receive over twelve millions of dollars for their wool and mutton. On an average the farmers of every county of Ohio receive over one hundred thousand dollars cash, annually, for their surplus wool and mutton.

"There is nothing within the domain of agriculture in which the permanent interest of even the average farmer may be more essentially promoted than by sheep-raising and goat-raising. And yet, on account of the strangely delusive dog detriment, of which *The South* has so often complained, indefinite millions of dollars are annually lost to the Southern country, on account of the enforced neglect or abandonment of sheep culture—to say nothing of the dangers and death from the most hideous madness—all endured out of deference to the dogs. What men!

"As the writer quoted well and truly says, sheep are an emblem of civilization. He should have added—peace and innocence. Wherever you find them in greatest numbers, you will find wealth and prosperity. This is true the world over. A sheep is a producer in two senses: it produces both food and clothing, and also enriches the land it occupies more effectually than can be done in any other way. And this destruction among almost the most useful of our domestic animals is nearly as much to be deplored on account of the worthless and wanton character of the de-

stroyer and the utterly defenseless and helpless nature of his victim, as from the economic view of the matter. It thus seems the more strange that measures are not carried to the point of exterminating this enemy of the sheep; for it is quite within the power of sheep-raisers and farmers generally, legislatures failing them, to rid themselves effectually of this foe to their flocks. It only requires a little more energetic endeavor than has heretofore been apparent among farmers, with a little science and something of method and combination in their efforts, to thoroughly suppress this evil.

"Farmers have need of watch-dogs to guard their flocks and other property; but they should adopt and enforce a strict rule among themselves to tolerate none but a good breed—the shepherd dog, heretofore commended in these columns, being sufficient for all ordinary purposes. All dogs habitually inclined to wander from home should be destroyed. The country cannot suffer any loss in the suddenness and completeness of their taking off. Sheep-raising will then become at once safe and one of the most prosperous and agreeable pursuits of the American agriculturist.

"Those States, or parts of States, in which the dogs threaten to outnumber the people, are, at best, fostering a very crooked agricultural enterprise. The expenditure of labor and capital necessary to the commencement of successful sheep husbandry is so small, and the profits are so comparatively large, that people should be encouraged to engage more extensively, as well for their own as for the general good, more especially as, in the South and Southwest, there are not only naturally fertile lands that need the restorative presence of the sheep, but also many and vast areas of land awaiting the coming of the shepherd and the goatherd and his flocks, and seemingly designed by nature to enrich him and the country through them.

"But before the impoverished farms, or the now worth-

less wilderness can blossom with the fleecy whiteness of the sheep and the goat, they must be protected from the dogs. This is no doubt really the duty of the States—a humane and economic duty. But if the States fail of their duty in the premises, the farmers must do it. And if no higher or nobler motive impels them, let a mercenary one suffice to stop the neglect and waste of wool and mutton, and so promote the universal increase of the flocks and herds, the wealth of the nation and the prosperity of all."

CHAPTER XI.

DISEASES OF SHEEP.

The digestive system of the sheep is the most powerful of all the domestic animals, the principal energy of the nervous system being expended on that branch of the organism. The skeleton is nearer that of an ox than any other animal, and both alike are ruminants, that is "cud chewers." Perhaps there is a more universal ignorance of what is "cud" than one would suppose. It is often thought that when the sheep loses its cud it is in great and imminent danger of its life, and many devices are resorted to to avert so great a calamity. Now, practically, this is true so far as the danger is concerned, but replacing it with an artificial one is the veriest nonsense. It denotes a bad condition of the digestive organs not to be able to regurgitate the cud, and unless that condition is quickly altered the animal will surely die. This will become apparent when the anatomy of the sheep is understood. We do not, however, deem it necessary in our limited space to give a detailed account of the structure of the sheep any more than is necessary to explain the *modus operandi* of digestion wherein it is different from other domestic animals. There is but little difference between this in sheep and cattle, both as before stated being ruminants.

The stomach is a large pouch, with irregular sacs, that however communicate with each other, but are designated as separate stomachs. There are four of these sacs, called the rumen or paunch; reticulum or honeycomb; omasum or manyplies; and the abomasium or rennet. The gullet or swallow leads into the rumen or paunch, and the gut or duodenum leads out from the rennet. The gullet enters the

paunch so near the honeycomb that the latter is supposed to be a sort of reservoir to the paunch, holding the food for the re-chewing and ruminating process.

The act of rumination is chewing the cud, and is explained as follows: The animal eats rapidly, chewing very slightly, and continues until the paunch and honeycomb are filled. By an act of muscular contraction, under the will of the animal, the paunch compresses a wad of the indigested food, and returns it to the mouth, where it is masticated thoroughly and returned to the paunch, and is passed by that into the third stomach or manyplies, so called from the number of plaits or folds of the mucus membrane lining it. Here it undergoes some unknown preparation, and passes into the rennet, where the gastric juice is secreted, and now undergoes true digestion. Sometimes a very small quantity of food is swallowed, and so well chewed up that it passes directly on for digestion without being eructated for regrinding, and this is the case where meal or some other concentrated form of nutriment is used; then they do not chew the "cud," and yet are not sick. The folly of supposing a piece of dried beef or a rag will serve the purpose of a cud is apparent after this explanation of what it is. Sometimes the vegetable matter in the first stomach ferments, and such a quantity of gas is generated the sheep swells to bursting, and is utterly unable to throw up the "cud." This is called

HOVEN,

and is quite common in sheep when turned on a fine, rich pasture, especially clover. It is known by the large distension of the sheep, especially on the left side. The size of the stomach interferes with the room for breathing, consequently the breathing is short, in fact it becomes so short there is danger of suffocation unless relief comes speedily. It requires something to stop the fermentation, and saline mixture by chemical reaction on the acid contents of the

stomach will neutralize it, and the relief is immediate. Spirits of ammonia, a teaspoonful in one-half pint of water, given with a horn or bottle as a drench will be effective. It should be followed up with a dose of Epsom salts, to carry off the offending substance. Carbonate of soda, such as is used for making biscuits, will answer if ammonia cannot be procured. A tablespoonful every half hour, until relieved, should be given either in water or let the tongue be pulled out and the soda emptied on its root. The withdrawal of the tongue into the mouth will carry the medicine down the throat. A bolus of lime and flour mixed and greased with lard, and pushed down the throat, is also effective. Chloroform and laudanum in equal quantities, a half teaspoonful each every hour or two will also oftentimes give relief. Sometimes, however, the swelling has progressed so far that medicine fails to give any relief. Then as a *dernier resort* the side must be punctured with a trochar, such as surgeons use in dropsy. Every doctor has one. This will prevent the escape of the contents of the stomach into the cavity of the abdomen, producing thereby inflammation of the bowels, or rather peritonitis. This will permit the gas to escape, and then the saline medicines should be administered to prevent its re-formation.

The intestines of a sheep are very long, being twenty-eight times longer than its body, while those of man are only five times longer. In their great length there is room for many diseases, conspicuous among which the

TAPE-WORM

is most common. They contract this disease by swallowing along with grass the eggs that have been voided by animals of various kinds infested with them, especially the dog. Sheep dying from worms are found after death to have the bowels packed full of them as if stuffed. The symptoms are variable, appetite sometimes being voracious, and again

refusing food altogether, loss of condition, and a morbid appetite for stones, gravel, ashes, sand and earth. The dung becomes soft, losing its ball-shape, and adhering to its legs and tail, making the shrub appear quite filthy. This disease cannot be prevented, as it is liable to come from wild and domestic animals alike, but it is easily cured. Take turpentine and linseed oil, two parts of oil and one of turpentine, and mix in a strong decoction or tea, made of worm seed, and drench the sheep about twice a week. In two or three weeks it will get well, and begin to fatten. An old sheep, or after six years of age, will not have them.

THREAD WORMS

are also common in sheep. Affected with these they will lose flesh rapidly, and have diarrhæa constantly. The worms will be seen about the vent. Salt and copperas administered freely will soon relieve them, or if that does not then use the turpentine and linseed oil. There are many other forms and kinds of worms, but the treatment is the same. They must be well fed after treatment.

Sheep are infested with worms in the nose, called *astrus ovis* (Sheep gad-fly), and produced from the eggs of a large two-winged fly. The frontal sinuses above the nose in sheep and other animals are the places where these worms live and attain their full growth. These sinuses are always full of a soft white matter, which furnishes these worms with a proper nourishment, and are sufficiently large for their habitation, and when they have acquired their destined growth in which they are fit to undergo their changes for the fly-state, they leave their old habitation, and falling to the earth, bury themselves there, and then they are hatched into flies. The female, when she has been impregnated by the male, knows that the nose of a sheep or other animal is the only place for her to deposit her eggs in order to their coming to maturity. The fly produced from this worm has

all the time of its life a very lazy disposition, and does not like to make any use either of its legs or wings. Its head and corslet together are about as long as its body, which is composed of five rings, streaked on the back, a pale yellow and brown are then disposed in irregular spots, the belly is of the same colors, but they are more regularly disposed, for the brown hue makes three lines, one in the middle, and one on each side, and all the intermediate spaces are yellow. The wings are nearly of the same length with the body, and are a little inclined in their position, so as to lie upon the body. They do not, however, cover it, but a naked space is left between them. The fly will live two months after it is first produced, but will take no nourishment of any kind, and possibly may be of the same nature with butterflies, which never take any food while living in that state.

The treatment for this affection is comprised in one word, and that word is tar. It may be applied in any way to the nose, but the best method of doing so is to bore a hole in a log, fill with tar, and put some salt over it. In this way a hundred sheep will tar their own noses in a few minutes.

SCAB

is a cutaneous disease, owing to an impurity of the blood, and is most prevalent in wet lands, or in rainy seasons. It is cured by tobacco-water, brimstone and alum boiled together, and then rubbed over the sheep. Another remedy is to dip the sheep in a strong decoction of tobacco, rubbing it well into the wool and skin.

HYTADIDS

is a distemper caused by bladders of water gathering in the head. No cure has been discovered.

THE RICKETS

is a hereditary disease, for which no antidote is known. The first symptom is a kind of light headiness, which makes the

afflicted sheep appear wilder than usual when approached. He bounces up suddenly, runs to a distance as though pressed by dogs. In the second stage the principal symptom is the sheep rubbing himself against trees, etc., with such fury as to pull off his wool and tear away his flesh. The last stages of the disease seem only to be the progress of dissolution after an unfavorable crisis. The poor animal, as condemned by nature, appears stupid, walks irregularly (whence probably the name of rickets), generally his head down, and eats little. These symptoms increase in degree till death, which follows a general consumption, which appears upon the dissection of the carcass.

THE FLUX

is another disease sheep are subject to. The best remedy is to house the sheep immediately, keep them warm, and feed them on dry hay, giving them frequent glysters of warm milk and water. The cause is either feeding on wet lands or on grass that has become mossy.

The popular theory, says Mr. Randall, is that

THE GRUB

causes death by boring through the bony walls which surround the brain. This seems to me an absurdity. If the grub actually penetrates to the brain, the fact would be readily disclosed after death. The full-grown grub would naturally leave an orifice of considerable diameter through the skull. Who has seen such an orifice? During the ascent of the larvæ the sheep stamps, tosses its head violently, and dashes away from its companions wildly over the field. The larvæ remain in the sinuses feeding on the mucus secreted by the membrane, and apparently creating no further annoyance, until ready to assume their proper form in the succeeding spring.

Smearing their noses with tar, it is supposed, will keep

the fly from depositing its eggs. Blacklock says that the larvæ may be dislodged by blowing tobacco smoke through the tail of a pipe into the nostril. The Mexican shepherds apply calomels to the parts.

Lambs when first dropped may appear strong and healthy, yet in a few days they begin to droop, and finally die. If you open the stomach of such lambs, in some cases you will find it packed and distorted with a hard curd, which was the cause of their death. The remedy is to feed the breeding ewes with some kind of a mild alkali, like ashes, for some time previous to their lambs being dropped.

ROT.

This is one of the most fatal diseases with which sheep are afflicted. On dissecting sheep that die of this disorder, a great number of insects called 'flukes' are found in the liver. That these flukes are the cause of the rot therefore is evident, but to explain how they come into the liver is not so easy. It is probable that they are swallowed while in the egg state. The eggs deposited in the tender germ are conveyed into the stomach and intestines of the animal, whence they are received into the lacteal vessels, carried off into the chyle, and pass into the blood. Nor do they meet with any obstruction until they arrive at the capillary vessels of the liver. Here the blood filterates through the branches, through the extreme branches, answering to those of the *vina porta* in the human body. The receiving vessels are too minute to admit the impregnated ova, which, adhering to the membrane, produce these animalculæ that feed upon the liver and destroy the sheep. They much resemble the flat fish called *plaice*, and are sometimes as large as a silver two-pence. It is therefore easy to conceive that sheep may, on wet ground especially, take multitudes of these eggs in their food, and that the stomach and viscera of the sheep being a proper residence for them, they of course hatch, and

appearing in their fluke or last state, feed on the liver of of the animal, and occasion this disorder. It is a singular fact no ewe ever has the rot while she has a lamb by her side. It may be that the impregnated ovum passes into the milk, and never arrives at the liver. It is said that parsley is a good remedy, given as a strong decoction. Salt is also a useful remedy; salt is pernicious to most insects. Lisle speaks of a farmer who cured his whole flock by giving each sheep a handful of Spanish salt for five or six mornings successively. In wet, warm weather the prudent farmer will remove his sheep from the lands liable to rot.

DIARRHŒA.

This disease is often more properly a *nervous* than a *febrile* one—in the former case a morbid increase of the peristaltic motion of the bowels; in the latter an inflammation of the mucous coat of the smaller intestines. It is brought on by sudden change from dry food to green, or by the introduction of improper substances into the stomach. It is important to clearly distinguish this disease from dysentery. In diarrhœa there is no apparent general fever. The appetite is good, the stools are thin and watery, but unaccompanied with slime and mucous and blood. Confinement to dry food for a day or two oftentimes suffice for grown sheep. To lambs, especially if attacked in the fall, the disease is more serious. If the purging is severe, accompanied by mucous, give a gentle cathartic—half a drachm of rhubarb, or an ounce of Epsom salts, to the lamb. This should be followed by an astringent—say one-fourth ounce of prepared chalk in half a pint of tepid milk once a day for three days, which will be generally sufficient. Another remedy: prepared chalk, one ounce; powdered catechu, half an ounce; powdered ginger, two drachms; powdered opium, half a drachm; mix with half a pint of peppermint water; give two or three table-spoonsful morning and night to sheep; half that quantity to a lamb.

For Dysentery—"Administer a couple of purges of linseed oil, followed by chalk and milk, as in diarrhœa, doubling the dose of chalk, twenty drops of laudanum, with ginger and gentian powder."

For Colic—Sometimes called *Stretches:* Give one-half ounce Epsom salts, sixty drops of peppermint, one drachm ginger. Salts alone will generally effect a cure.

SHEEP TICK.

This troublesome insect infests sheep of all ages, but none so much as yearlings; but it can be easily and effectually eradicated. For one hundred lambs use five pounds of inferior tobacco, or ten pounds of stems, boil it for several hours; then take two buckets full of water and one from the boiled liquor, and keep adding till thirty gallons of decoction is made; immerse the lambs, and let the liquor drain off into the tub again to avoid waste. About a week after shearing, the ticks will have left the ewes and fastened themselves upon the lamb, which will be the proper time to attend to them. The lambs must be held by the head with both hands, and then dipped to the ears, using great care that none of the decoction gets into the eyes or mouth. It will not be necessary to dip the ewes. The tobacco decoction will be found excellent for slight wounds of the skin and cutaneous irritations from johnswort. "Buchan's carbolic sheep dip" will do it more effectually than tobacco, and is less troublesome to use. Directions are for the preparation in the drug stores.

MAGGOT FLY.

Sheep in summer are subjected to extreme annoyance from flies—the gad-fly and several other varieties. They deposit their eggs among the wool. When the eggs are hatched, which is almost instantaneous, the maggot erodes the skin, and soon brings the adjacent parts into a fit condi-

tion for the reception of others. The backs of the long-wooled sheep are, from their exposure, more liable to be selected by the flies as a receptacle for their eggs than the corresponding parts that are covered by a short thick fleece.

As soon as the maggot begins its operations the sheep becomes restless and uneasy, rubbing itself on stones and trees, endeavoring to free itself from the annoyance. If not relieved, death will inevitably ensae. Tar, with spirits of turpentine, may be applied about the ears, horns, tail, and to the parts affected, or flour of sulphur mixed with melted butter. Calomel is also an excellent remedy for this as for all sores; every sheep and stock raiser should keep a bottle of it on hand. It is a cheap and convenient remedy, and always ready for use.

WOUNDS

may originate in a variety of ways, and may be of any extent. In the first place, if the bleeding is very extensive, it must be stopped by getting a hold on the end of the artery, and give it a few twists. This will generally put a stop to it, as sheep rarely bleed to death. The wound should be washed clean, and if it gapes open a few stitches should be taken in it to close it up. It should then be smeared over with tar, grease, and a little vitriol mixed with it. This will not only promote healing, but will keep off the fly, which will inevitably grow a crop of maggots on it if allowed to go without. Should the maggots appear at any time, grease will destroy their lives at once, as they breathe through pores of the skin, and the grease entering and stopping these pores suffocates them at once.

Let it be borne in mind, however, that the best way to cure a disease is to prevent it. Let all care be taken possible, have good pastures and good shelters, and feed well, and there will be but little use for the veterinary surgeon.

DISEASES OF FEET.

The foot of a sheep is peculiarly liable to disease, from the fact that the outer horn or crust is connected directly by a vascular structure to the bone itself, which is unlike the horse, the latter having the hoof connected by means of laminæ, so that in the horse the hoof can bear a vast amount of concussion without injury. The hoof of a sheep's foot grows from the underlying vascular surface, just as the nails of the human foot. There is a small canal that opens out on the front of the foot, about an inch above the fork of the hoof. This canal leads backwards and downwards to a gland which secretes mucus that overflows down between the toes, keeping them moist. Sometimes this canal gets stopped up, and then ulceration ensues, making the sheep lame until it bursts out and empties itself. This canal is called the interdigital canal, and if the sheep is seen limping at any time, and no other cause can be detected for it, it will be best to run a straw or knitting needle into the canal.

Foot-rot.—But the most formidable disease of the foot is the foot rot. Being contagious, unless it is promptly checked, it will get all over the flock. It is most common in sheep that run on wet pastures. The whole hoof is involved, and unless it is soon cured the hoof comes off. When sheep are observed limping, if, on examination, the heel and between the toes are found full of blisters, it may be known at once to be foot-rot. The feet are so painful the sheep will be seen walking on their knees. Many remedies are offered, but the first thing is to put them on dry pastures so that remedies will adhere to the feet. As soon as the disease is recognized, let all the dead or dry parts be trimmed off, and then washed about twice a week in carbolic acid soap, and after each washing wrap the foot

up in a tow cloth that has been dipped in the following mixture:

Oxide copper	4 oz.
Arsenic	½ oz.
Acetic acid	3 oz.
Honey	8 oz.

Or the foot may be smeared with the following mixture:

Powdered blue vitriol	1 lb.
Verdigris	½ lb.
Linseed oil	1 pt.
Pine tar	1 qt.

This will stick to the foot, and is very effective.

The digital canal should be kept open. Another method is the following, which can be more easily applied, especially where many are affected:

Procure a tub sufficiently large for two sheep to stand in it; pour into the tub a saturated solution of blue vitriol and water, *as hot as can be endured by the hand for only a moment.* Have the liquor about four inches deep, and keep it at that depth by frequent additions of the hot solution. As soon as a sheep's feet are pared put him in the tub, and hold him there by the neck; get another ready and stand him by the side of the first. After the first has stood in the tub about five minutes, take him out and replace him by another, and so on till the whole flock have been gone through with. I have always found this remedy effect a *perfect* cure. The hot liquid penetrates to every cavity of the foot, and, doubtless, has a more decisive effect than is produced by merely wetting them. Twelve pounds of vitriol is sufficient for one hundred sheep.

PELT ROT.

This is a disease of the skin, as the name implies. It causes the premature falling off of the wool in the spring of the year.

It is produced by exposure during the winter, and low condition—the latter principally.

Preventive.—Good shelters and good keeping. Let the wool fluids be kept healthy and abundant, and there will be no danger of any attack from this disease.

CHAPTER XII.

THE STRUCTURE AND USES OF WOOL.

Wool is almost identical in its structure with hair, the only difference being that wool is curly and very fine, in contrast to hair, which is straight and coarse.

The peculiarity of the structure of wool, that causes it to "felt," is, first, its extreme curliness, and secondly, its scales. Hair grows from the true skin, passing through the outer or false skin. The one is called the derma, the other is called the epidermis. The hair follicle or germ is situated in the former, and is propagated by germs, which being formed by the follicle, the preceding ones are pushed out as the new ones are formed. These germs are in the shape of scales. If it were possible to make a stack of very minute fish scales, one upon another, with the center of each one capped and the fifth outer circle turned up, this tall stack would represent a hair. Looking at a hair from one side with a powerful microscope, it looks like a saw, or if the entire hair is seen it looks like a long cylinder covered with shingles. Take two hairs and place them together, with the ends reversed, and these scale points will hang. Rub a hair between the fingers and it will travel towards the upper end. This is caused by the points of these scales hanging to the fingers, and thus it is pushed along. It is this quality that makes wool felt; but it would still not felt well unless it was curved. Therefore wool, which as before remarked is curved hair, has minute waves in it. These are caused by a regular thickening of the cortical part of the fibre, and this thickening occurs alternately on one side or the other. The value of the wool depends upon this curly character, as the felting property is produced by it. There is great difference in the fineness of wool. The common coarse wools

stand at about the rate of 5,000 to 6,000 fibres to the square inch, while the fine Merinos require to the square inch 40,000 or even 48,000. To show the effects of breed upon the wool by actual experiment, a coarse wooled sheep with only one-twentieth of a Merino cross in it had 25,000 fibres to the square inch. This shows the great importance of having pure bred sheep for a certain purpose. It is said that the presence of one-millionth part of the blood of a coarse sheep is sufficient to reduce the fineness of the fleece perceptibly. These facts are given to show the great necessity of having absolutely pure breeds, if wool is the principle object of raising sheep.

All over the skin of a sheep are small glands that secrete a mucus called "yolk," that keeps the wool soft and prevents it from felting. When the yolk is first secreted it is fluid, and in some breeds it remains so. In the Merinos it becomes stiff and dry, and adheres to the wool, adding greatly to its weight. This yolk is an alkaloid substance, and forms a sort of soap, soluble in water. By its aid the wool can be washed without soap. This yolk forms about twenty per cent. of the weight of the wool. It is a great mistake, therefore, for persons to wash the wool to get a larger price, as some do. Besides, by withdrawing the yolk from the wool it becomes harsh and dry, and is much more liable to injure by felting or tangling. In some countries this yolk is preserved in the washing, and large quantities of potash are made from it. The presence of this yolk in wool is an indication of its superior quality, although it may be produced in such excessive quantities that it becomes a source of actual loss to the manufacturer. This is a question that will be settled by the wool grower and manufacturer.

CLASSIFICATION OF WOOL.

It is very important that persons engaging in wool growing should acquaint themselves with the kinds of wool calculated to bring the highest price; but it will be found a

difficult matter to keep up with the popular kinds, inasmuch as they are constantly changing. The sort of wool popular to-day or to-morrow, may be supplanted by some other kind next year.

The wools are divided into two classes, *short* and *long*. They are again subdivided into several grades, such as *superfine, fine, medium* and *coarse*. A former grade prevailed of carding and combing wools, but from the great improvement in the machinery used in woolen manufactures these terms have been well nigh discarded. At one time none but the Cotswold or kindred wools could be combed, but now the Merino and Southdown wools, even under three inches long, are included in the list of combing wools. At one time the price of Merino wool was by far greater than any other sort. Now the coarse and common breed wools sell for as much or more than the Merino. A few years ago, the Cotswold sold very much higher than other breeds, but the past year long wools were in less demand than the Southdowns. There is never, however, more than a few cents difference in the prices.

As a rule, medium wools come nearer bringing the best regular prices, as they offer a variety of wool for both combing and carding purposes.

It may be well to explain the difference between the two.

Combing wool is the kind that can be combed out into long fibres, and thus spun into thread. It is joined at the ends and shows no points of fibres sticking out. It is used for making cloths that show the thread, such as delaines, cashmeres and others of like character.

The *Carding* wools are those in which the fibres are so intermingled that the ends show in every direction, and of such are made cloth intended to be carded up to hide the threads, such as broadcloth, cassimere, cassinet and hats. Sometimes a fleece will felt on the sheep's back. This is an evidence of a low condition, or sick sheep, and they should

never be allowed to live to be shorn twice. It is the absence of yolk that produces it.

Wool in its native condition contains a large amount of impurities, such as sand, gravel, dirt, dung, twigs of trees, cedar leaves (in cedar countries), and many other things. The purchaser, of course, is not expected to pay full price for all these things, and yet the grower is not required to wash the yolk out. For the purpose of cleansing it of the more prominent impurities, many farmers resort to washing. This is generally and better done before shearing. In all old sheep raising countries it is looked upon as a frolic, where all the neighbors gather together, boys and girls, and make a frolic over it. Enough of the impurities can be got out in this way to make a fair merchantable wool, and at the same time not destroy the quality. Of course, let the seller wash it as much as he will, it still must be washed a great deal before it can be manufactured.

THE USES OF THE SEVERAL KINDS OF WOOL.

Kentucky and Tennessee wools are identical in quality and uses, and what is said in the subjoined article, taken from the *Rural New Yorker*, in reference to Kentucky wools will equally apply to those of Tennessee:

"There is always a satisfaction to the producer of raw material in learning the uses to which his products are to be put when manufactured. Many people keep different breeds of sheep, and have often but a misty notion of the purposes to which the wool of each variety is applied. In this connection, Leonard Drane lately read, at the annual meeting of the Kentucky Wool-Growers' Association, an address on wool and its classification for market. Besides a full account of the special subject which he proposed to treat of, the speech was rich in other information connected with sheep husbandry, and we have therefore here condensed it for the benefit of our readers.

"It has been asked of manufacturers, 'What is the most pressing necessity of your manufantue?' and answered, 'We want more domestic wool;' but I would say, we want more domestic wool improved to suit the manufacturer. There are forty-six mills in the United States that use foreign wool entirely, and seven hundred and sixty-seven that use both domestic and foreign wool, or nine hundred and thirty-one mills using seventy per cent. of foreign wool. Would manufacturers import wool if they were supplied at home with the various kinds they want to use? They would not.

"I have condensed the uses of wool into three classes from Mr. J. L. Hays' report to the Department of Agriculture in 1872. Merino wool is used in opera and common flannels, blankets, shawls, shirts, vests, skirts, drawers, cardigans, hose, fancy cassimeres, meltons, overcoatings, light coatings, fancy cloakings, some varieties of delaines, coburgs, cashmeres, ladies' dress goods, and all mixtures of wool with shoddy; the longest and finest Merino wools are used to carry wool substitutes. The peculiar excellence of Merino wools is found in the soundness and strength of all goods they are used in.

"Combing wools are used in shawls, fancy knit goods, ladies' fancy cloakings, serges, moreens, alpacas, cloth linings, mohair lusters, lasting, damasks for furniture, furniture covering, curtains, table-cloths, reps for furniture and curtains, webbing for reins, girths, suspenders, flags, military sashes, cords and tassels, nubias, braids, bindings, etc., etc.

"Coarse wools are used in common flannels, blankets, also the noils of combing wool. The warps of ingrain carpets, two or three-ply, consume our coarsest long wools; the shortest stapled coarse wools are used for filling.

"We should grow in Kentucky best pure Lincolnshire Cotswold, Ramboullet Merinos, and Southdowns, and cross them on our native sheep and each other until we establish new races. Kentucky stands fourteenth in the number of

sheep, compared to other States in 1876—Indiana, 1,250,000; Iowa, 1,663,900; Missouri, 1,284,200; Wisconsin, 1,62,800; Illinois, 1,311,000; Michigan, 3,450,600; California, 6,750,-000; Kentucky, 683,600; in the United States, 30,000,000 to 36,000,000. There are three States that have more sheep than Kentucky produces pounds of wool. No animal pays better profit. The clip of the United States for 1876 was about 200,000,000; of England, Ireland, and Scotland, about 162,000,000, mostly combing; of the continent of Europe, about 462,000,000; of Australasia, about 350,000,000; of Buenos Ayres and River La Plata, about 207,000,000. These are the principal wool-growing countries of the world, and produced 1,282,000,000 out of the estimated 1,419,000,-000 on the entire globe.

"The value of all kinds of wool is determined by its strength, luster, working qualities and shrinkage. Wool is divided by governments for tariff, and wool merchants, into three classes: Clothing, Combing, and Carpet, and is produced in quantities in this order. Kentucky wool should be classed as combing, delaine, medium coarse and black. Wool merchants separate each division into as many classes as there are distinct qualities of staple in each division, to suit the purchaser. Manufacturers take the fleeces, putting them into as many classes as there are distinct qualities of staple in each fleece, according to its length, color, luster, etc., except the gumming locks, which they will not buy unwashed.

"Clothing wool is generally divided into three classes—fine, medium and coarse. The average price for fifty-three years, since 1824, for each class, per washed pound, is for fine, 61½c.; medium, 56½c.; coarse, 51c., or nearly 5½c. per pound less on each class as it grows coarser. Average price per washed pound Australian in London, from 1862 to 1870, inclusive, as estimated by Mr. Bond, 43½c. gold. Counting freights, commission, etc., for same period, the average price in currency for washed Australian, would be 80c. per pound

in New York, or 19c. more than any of our clothing wools, and 29c. more than for our coarse wools. Card or X wools are required to be fine, short in staple, 'full of spiral curls and serratures.' Combing wool consists in drawing out the fibres straight and parallel; then twisting into yarn, called worsted, 'the ends in spinning being covered, make the yarn smooth and lustrous.' The staple should be generally five to eight inches long, having a few 'spiral curls and serratures,' with distinct luster.

"These qualities are found in the English in their order of perfection, as follows—The Lincolnshire, Leicester and Cotswold breeds. Delaine wools are shorter and finer, and can be used as short as $2\frac{1}{2}$ inches, but it must be very fine and nice. The coarser the staple the longer it must be. These are not classed in the trade as combing wools. There are fine, medium, and coarse combing wools. The duty on this wool will equal 11c. per pound, and ten per cent. ad valorum. Poorly-bred wools are very objectionable, having long, coarse, pen-pointed tops, with a fine downy bottom and coarse uneven fibres. These are generally sold for carpet wools. I need only say to the wool growers of this State that there is a wider field in the expansion of combing wool fabrics than your imagination can take in."

CHAPTER XIII.

STATE STATISTICS AND PRESENT CONDITION OF SHEEP HUSBANDRY.

During the fall of 1878 I sent circulars to the most prominent sheep raisers of every county in the State, asking for certain specific information in relation to sheep husbandry. Although no replies were returned from many of the counties, yet questions enough were answered to give a very correct idea of the present condition of sheep husbandry in this State. As to the number of sheep in each county, there were no means by which this could be determined, as our assessment laws do not require assessors to return the number of domestic animals. This much, however, is made apparent in the answers: that an earnest effort is making to improve the character of the flocks, both as to mutton and wool. Nearly every county reports the existence of high graded flocks. The Southdowns preponderate, the Cotswolds coming next, and the Merinos third. A few Leicester flocks are named, and some few good breeders in the State give them the preference over all others. Another prominent fact is brought out, and that is the very small annual cost of keeping sheep. Only two report the annual cost as high as $2.00 per head; thirteen above $1.00 to $1.50; twelve the cost to be $1.00; and twenty-three that the cost of keeping is below $1.00, in some instances reaching as low a figure as 33⅓ cents. Taking the average of each of the three divisions of the State, I find that the annual cost of keeping sheep in East Tennessee is $1.12; in Middle Tennessee 90 cents, and in West Tennessee 67 cents. This arises from the fact that the climate is more rigorous in the elevated regions of East Tennessee than in the lower ones of Middle and West Tennessee. The aver-

age elevation of East Tennessee, including the mountainous portions, is not far from 1,500 feet; of Middle Tennessee, also including portions of the Cumberland plateau, 1,000 feet; while the elevation of West Tennessee will hardly reach 500 feet, thus making a very perceptible difference in the number of cold days, and in the length of time between killing frosts and the consequent duration of green food. It has long been a well established fact that lambs are at least a month earlier in West Tennessee than in Middle, which can only be attributed to the fact of milder winters prevailing in West Tennessee, which induce very early growth of green grass.

Another fact is disclosed in these questions of paramount value to the sheep husbandman, and that is where improved breeds have been introduced, lambs bring in the market nearly double the price they do where only natives or low grades are bred. Not only do the lambs of well-bred sheep pay better, but the wool commands a readier sale at increased prices. It must be borne in mind that the prices given in this schedule were those of 1878, when wool was at its minimum price. Since that time there have been a wonderful improvement in price, and a much greater stimulus given to sheep husbandry.

The answers given to the question as to the yield of wool are not so gratifying. While the high grades yield from six to twelve pounds, the amount reported from the native sheep varies from one to four pounds. Here is the field for improvement. Our native flocks must be bred up until they shall make an average of at least five pounds per head. The demand for wool will, in all probability, be greatly increased during the next few years, and our farmers should seize the opportunity to increase the wool-producing qualities of their flocks.

The want of woolen factories is also made painfully conspicuous in the replies to the interrogatory asking for information on that subject. Only sixteen are given, and yet

the supply of wool for several years past could not have been less than 2,000,000 pounds annually. This has had to seek, in a majority of cases, a market beyond the county where it is raised. With so many fine water powers in the State, home capital would find a rich reward in working up our supply of wool into such fabrics as are demanded to clothe our population. Other replies to this question are more to be deplored. I refer to those which indicate that wool enough is not grown in the county to supply local demand. There is not a county in the State in which the farmers cannot raise wool enough to clothe the inhabitants at a less cost than so many pounds of cotton would be. Take the average annual cost of keeping sheep, which for the State is not far from 80 cents per head, and credit each with $3\frac{1}{2}$ pounds of wool, the average of all breeds, and at present prices there will be an actual profit of 95 cents on each sheep kept, disregarding entirely the value of lambs, which would add nearly double as much, assuming the greater part of the flock to be ewes. A neglect by the farmers of our State to see and appreciate these facts is not encouraging, especially when persons from every part of the United States are now seeking for locations in the State for the purpose of engaging in sheep husbandry. Never was the time more propitious for seizing upon this industry and pushing it, which can be made more remunerative in proportion to the capital employed than any other occupation in the State.

Continuing the analyses of the answers given to the schedule, I find a discouraging item in the large number of sheep that have fallen a prey to the ruthless curs that prowl and growl and howl through the State. A very cursory glance at the replies to the question as to the number of sheep annually destroyed by dogs will serve to show that not less than 7,000 are annually immolated upon the altar of caninal affection. These 7,000 sheep would clothe comfortably 7,000 persons, and feed 2,000 more, and yet the 182,000

dogs in the State are, in the estimation of many persons, worth more than the 1,000,000 head of sheep, which supply food and raiment to nearly as many people. The intelligence of the State should make an earnest endeavor to correct public sentiment in this regard, and give greater protection to a species of property so necessary to man's comfort and welfare.

It is very gratifying to know that no virulent disease, have ever infested the flocks in this State. Foot-rot, braxy, water in the head, and numerous other diseases, are almost unknown in this latitude. Old age and dogs are almost the only enemies to our flocks. The first is inevitable; the last may be corrected by legislation, supported by an enlightened public sentiment.

The explanation of the appended schedule is very simple. The numbers adjacent to the name of each person are placed adjacent to the answers given by that person under all the questions. The county to which the answer refers can be ascertained by turning to the list of names, and looking at the number corresponding to the answer. A careful study of this schedule will well repay the time employed, and give specific answers to questions concerning sheep husbandry in the counties reported.

SCHEDULE OF QUESTIONS SENT OUT AND ANSWERS RECEIVED.

No.	Names of Correspondents.	Postoffices.	Counties.
1	Thos. G. Mosley	Bellbuckle	Bedford.
2	W. P. Smallwood	Paris	Henry.
3	H. F. Coleman	New Sedalia	Hancock.
4	W. P. Gass	Washington	Rhea.
5	John H. Cole	Waynesboro	Wayne.
6	G. W. Boyd	Wayne Furnace	Wayne.
7	D. M. Jones	Sharon Station	Weakley.
8	T. J. Little	Dresden	Weakley.
9	John S. Claybrooke	Triune	Williamson.
10	A. B. Cummings	Jonesboro	Washington.
11	J. N. Gurthrie	Gallatin	Sumner.
12	Jas. M. Head, M. D	Gallatin	Sumner.
13	John B. Baker	Gallatin	Sumner.
14	F. F. Pierce	Gallatin	Sumner.
15	M. L. Thomas		Sullivan.
16	R. A. Salisbury		Stewart.
17	Jas. M. Stewart	Dunlap	Sequatchie.
18	John Alley	Walnut Valley	Sequatchie.
19	J. W. Fort	Sadlersville	Robertson.
20	C. C. Bell	Springfield	Robertson.
21	W. D. Browder	Half Moon Island	Roane.
22	J. F. Campbell	Murfreesboro	Rutherford.
23	E. Boyd	Benton	Polk.
24	W. H. Caldwell	Rives	Obion.
25	J. D. Goodpasture	Livingston	Overton.
26	H. H. Matlock	Riceville	McMinn.
27	H. B. Topling	Purdy	McNairy.
28	M. A. Hardin	Decatur	Meigs.
29	Geo. W. Atchley	Decatur	Meigs.
30	E. F. Sharp	Ten Miles Stand	Meigs.
31	A. R. Reid	Denmark	Madison.
32	John Y. Keith.	Jackson	Madison.
33	Stephen L. Ross	Lexington	Henderson.
34	John J. Boon	Jackson	Henderson.
35	N. B. Chears	Spring Hill	Maury.
36	J. C. Kelso	Fayetteville	Lincoln.
37	A. O. Williams	Marcella	Lawrence.
38	R. S. Bradford	Tiptonville	Lake.
39	Robt. C. Nall	Tiptonville	Lake.
40	John C. Mosley	Ripley	Lauderdale.
41	Jas. M. Swain	Holt's Corner	Marshall.
42	Geo. T. Allman	Cornersville	Marshall.
43	Geo. F. Hesselmeyer	Tazewell	Claiborne.
44	Elijah Dougherty	Baker's Gap	Johnson.
45	Pinckney McCarver	Flyn's Lick	Jackson.
46	C. T. P. Jarnagin	Mossy Creek	Jefferson.

SCHEDULE OF QUESTIONS—*Continued.*

No.	Names of Correspondents.	Postoffices.	Counties.
47	W. C. Doughtenson	Waverly	Humphreys.
48	Hillman Ewin	Hurricane Mills	Humphreys.
49	Thos. V. Eskridge	Bold Springs	Humphreys.
50	D. P. Williams	Brownsville	Haywood.
51	Tom Crutchfield	Chattanooga	Hamilton.
52	T. S. Easley	Centreville	Hickman.
53	Jas. R. Morly	Somerville	Fayette.
54	J. K. P. Blackburn	Lynnville.	Giles.
55	John F. Hauser	Gruetli	Grundy.
56	J. T. Trapp	Smithville	DeKalb.
57	Louis M. Williams	Henburn	Dyer.
58	Wm. Williams	Edgefield	Davidson.
59	E. D. Hicks	Nashville	Davidson.
60	J. S. Lindsay	Jacksboro	Campbell.
61	Michael Hoover	Viola	Coffee.
62	John L. Maxey	Celina	Clay.
63	T. J. Knox	Charleston	Bradley.
64	Jas. S. Pope	Stephen's Chapel	Bledsoe.
65	F. M. Lavender	Franklin	Williamson.
66	G. W. & D. A. Walker	Friendship	Crockett.
67	Geo. H. Morgan	Gainsboro	Jackson.
68	M. G. Gholson	Clarksville	Montgomery.
69	Lorenzo Stratton	Grassy Cove	Cumberland.
70	A. S. Snow	Tazewell	Claiborne.
71	E. M. Betts	Claybrook	Madison.

QUESTIONS AND ANSWERS.

What is the estimated number of sheep in your county?

1. 10,000 or 15,000.
2. No answer.
3. Between 5,000 and 7,000.
4. No answer.
5. About 3,000.
6. 4,000.
7. Have no idea, but less in proportion to other stock.
8. Have no means of ascertaining.
9. About 15,000.
10. About 6,000.
11. 10,000 of all breeds and grades.
12. 5,000.
13. Cannot answer, but suppose about 3,000 or 4,000.
14. Estimated at 15,000 to 20,000.
15. No answer.
16. No answer.
17. 2,500.
18. 1,200.
19. 7,000.
20. About 10,000.
21. 3,000.
22. About 8,000.
23. 5,000.
24. 12,000.
25. 15,000.
26. No answer.
27. No answer.
28. 5,000.
29. About 1,000.
30. About 2,000.
31. No answer.
32. 15,000.
33. Not able to answer.
34. No answer.
35. 20,000.
36. No answer.
37. No answer.
38. 600.
39. 600 or over.
40. 1,000 to 2,000.
41. 3,500 to 4,000.
42. 20,000.
43. No answer.
44. About 8,000.
45. 2,000.
46. 1,000.
47. 20,000.
48. No data to go by.
49. Don't know.
50. 2,000 to 2,500.
51. Am not advised.
52. 8,000 to 12,000.
53. A good many small flocks.
54. About 2,000 to 2,500.
55. 1,000 to 1,500.
56. About 20,000.
57. A number of small flocks.
58. Don't know.
59. 4,000.
60. 7,000.
61. No. answer.
62. 12,000.
63. 6,000.
64. Do not know.
65. Do not know.
66. About 3,000.
67. About 2,500.
68. Have no means of knowing.
69. Do not know.
70. Cannot answer.
71. 5,000.

What breed of sheep are best adapted to your soil and climate?

1. Merino, Cotswold, Leicester, Southdown, all do well.
2. No answer.
3. Cotswold, Southdown.
4. No answer.
5. A cross of the Southdown and Cotswold.
6. Cotswold and Southdown.
7. Southdown, but any will be healthy.
8. The only breed in the county is scrub.
9. Southdown and the common native breeds.

10. The old common stock crossed with Cotswold.
11. Southdowns, good medium wool, best mutton, long lived.
12. All breeds thrive and do well.
13. Native the hardiest, crossed with Southdown.
14. Southdown and Cotswold. All breeds do well.
15. No answer.
16. No answer.
17. No answer.
18. Southdown.
19. Merino and Southdown.
20. Southdown.
21. Merino.
22. No answer.
23. Common stock.
24. Southdown is considered the best improved breed.
25. Leicester crossed with Cotswold.
26. Grade Cotswold.
27. All breeds thrive well.
28. Southdown.
29. Cotswold.
30. My flock are all Merinos. They are doing well.
31. All kinds do well if attended to.
32. Cotswold and Southdown.
33. All kinds that have been tried do well.
34. Cotswold and Southdown.
35. Cotswold and Shropshire.
36. No answer.
37. Southdown and Merino.
38. No answer.
39. None but natives in this section.
40. No answer.
41. Southdown.
42. Cotswold and Southdown.
43. Southdown.
44. No answer.
45. Southdown, Leicester.
46. Native crossed with Cotswold.
47. Southdown the hardiest.
48. Southdown.
49. Cotswold and Southdown crossed with natives.
50. Cotswold, Southdown and Merino.
51. All the improved breeds do well with proper care.
52. Southdown and Cotswold.
53. No answer.
54. All descriptions do well.
55. Southdown.
56. Cotswold and Southdown.
57. Southdown and Leicester.
58. The large breeds not so well as small.
59. Southdowns, and their grades on native sheep.
60. Southdowns are supposed to be the best.
61. Cotswolds and Southdowns.
62. Not tested. Southdowns and Cotswold have been introduced.
63. The Kentucky improved, which is a breed between the Merino and Cotswold.
64. All kinds do well.
65. Southdowns and Merino.
66. Cotswold and Southdown.
67. Think it good for almost any kind raised.
68. The cross of Southdowns and Cotswolds upon common sheep.
69. Sheep of a Spanish origin decidedly.
70. Southdown.
71. Southdown.

What are the principal breeds now raised by your farmers?

1. Native crossed upon Cotswold and Southdown.
2. Cotswold, Southdown and native.
3. Cotswold and Southdown.
4. No answer.
5. Three-fourths common or scrub.
6. Scrub stock.
7. Native scrub.
8. Scrub, with few exceptions.
9. Cotswold, Southdown, and crosses from them.
10. Common, Cotswold and Southdown.
11. Scrubs and cross breeds.
12. Southdown, Cotswold and native
13. All kinds.
14. Southdowns and Cotswold.
15. Cotswold, Southdown and Merino.

16. A cross with native and Cotswold.
17. Common scrub stock, with few improved breeds.
18. Principally scrubs.
19. The majority are common breeds
20. Southdown and Cotswold grades
21. Scrub, Merino, Cotswold.
22. Low grade principally. Cotswold bucks used.
23. No variety. No special interest taken in sheep raising.
24. Common breeds.
25. Common stock, Leicester and Cotswold.
26. Cotswold and common.
27. Southdown, Oxford-Down, Cotswold and common.
28. Scrub, Cotswold, Merino.
29. Common, Cotswold, Merino.
30. Native stock.
31. Southdown, some Cotswold and common.
32. Mostly scrub. A few Cotswold and Southdown.
33. Common principally. Some Southdown.
34. Common.
35. Southdown, Cotswold grades.
36. Grade sheep.
37. Native, Southdown, and Cots-
38. Mostly native sheep.
39. Native.
40. Common sheep.
41. Southdown are becoming the principal sheep.
42. Cotswold and Southdown. A few Merinos.
43. Old stock.
44. Old native or mountain stock.
45. Southdown, Leicester and common.
46. Native. Some improved breeds.
47. Common scrub.
48. Southdown and Cotswold.
49. The majority old stock.
50. Common, Cotswold and Southdown.
51. Native. Some improved breeds.
52. Rocky mountain, or scrub.
53. But little attention paid to this industry.
54. Southdown, Cotswold, Merino, scrub.
55. Cross with the Merino and native sheep.
56. A mixture of all breeds.
57. Scrubs, being crossed with improved breeds.
58. Natives and improved.
59. Scrubs.
60. A majority scrubs, some improved breeds.
61. Cotswold and Southdown.
62. Common mountain sheep.
63. Common crossed with Cotswold.
64. Native and Merino, some Cotswold and Southdown.
65. Cotswold, Southdown and native
66. Cotswold and Southdown.
67. Mostly scrubs; a few Cotswold and Southdowns.
68. Cotswold and Southdowns, crossed on common sheep.
69. Mostly natives, with a few Spanish and Southdowns.
70. Scrubs and Southdowns.
71. Scrub.

What number are sold out of the county, and in what market?

1. About 6,000. Atlanta and Louisville mostly.
2. No answer.
3. 2,000 to 2,500.
4. No answer.
5. About 500 to Memphis.
6. 1,500 to 2,000.
7. Very few to New Orleans.
8. Do not know.
9. About 5,000 to Nashville; lambs to Cincinnati and New York.
10. About 3,000 to eastern markets.
11. 2,000 old sheep to Nashville, Louisville and Cincinnati.
12. 1,000 monthly to Nashville and Louisville.
13. A good many to Louisville and northern markets.
14. About 1,500 sent to Nashville and northern markets.
15. 2,000 to 3,000 to eastern markets.
16. None.
17. 500 to go South, Atlanta, Ga.
18. 500 to Atlanta.

19. About 10 per cent. of the number sold to Nashville.
20. About 2,000 to Nashville.
21. Comparatively none.
22. No answer.
23. From 5,000 to 7,000, to Atlanta and Augusta.
24. No answer.
25. About 2,500, mostly to Kentucky
26. Very few shipped out of the county.
27. 3,000, to Memphis, Jackson, Mobile.
28. 300 to Atlanta.
29. Very few, to go North.
30. Very few, to Atlanta.
31. Home market; Jackson 200, Memphis 300 to 400.
32. About 4,000 to Memphis in 1876
33. Not able to give a correct answer.
34. Very few.
35. No answer.
36. Three-fourths, to go North.
37. No answer.
38. A few sold for Memphis.
39. A few sold for Memphis.
40. None.
41. Two-thirds of the crop to Nashville.
42. 10,000 full bloods sold South; grade lambs to the butchers.
43. 2,000 to Kentucky.
44. 1,000 to Baltimore.
45. 2,000 to Nashville and Kentucky
46. Not many; a few to go East.
47. About one-fourth to Memphis.
48. Don't know; Memphis principal market.
49. Do not know; a good many sold to Memphis.
50. None sold out of the county.
51. Don't know; some sold to go South.
52. 500 to 1,000 to traders and feeders.
53. No answer.
54. A few to Memphis and Nashville.
55. None.
56. 1,000 per annum.
57. None of consequence.
58. Do not know.
59. No answer.
60. From 1,000 to 2,000 to Kentucky.
61. 1,000 to 2,000 to Nashville and Louisville.
62. Don't know; those sold go to Louisville.
63. 3,000 to go South.
64. 500 to Chattanooga.
65. 2,000 to Nashville for shipment.
66. 200; various markets.
67. 300 or 400.
68. Do not know, not many.
69. Some for northern markets and some for southern.
70. Some to Kentucky.
71. Jackson is our market.

What is the average price obtained for them?

1. Average price $2.50.
2. No answer.
3. For two years past 1⅞c per lb.
4. No answer.
5. About $3.00 per head.
6. $1.50.
7. $1.50 to $2.00.
8. $1.50.
9. $2.50.
10. $1.25.
11. $3.50.
12. $5.00.
13. $3.00.
14. 4c to 4½c per lb.
15. $1.50 to $2.00.
16. Native. $2.00.
17. 3c to 3½c per lb.
18. 3c per lb.
19. $3.50 to $4.00.
20. $3.00.
21. No answer.
22. $2.50 to $3.00.
23. $2.50.
24. $2.00.
25. $1.50.
26. $5.50 for common, $6.00 to $10.00 for grade Cotswold.
27. $2.00.
28. $2.00.
29. No answer.
30. $1.50 to $2.00.
31. Spring lambs $2.50; one to two years old $3.50.
32. $3.50.

33. $1.50 to 2.00.
34. $2.25 to $3.00.
35. $2.00 to $5.00.
36. 2½c per lb.
37. $3.00.
38. $3.00.
39. $3.00.
40. No answer.
41. $2.50.
42. Full blooded Cotswold $15.00; Southdown $5.00 to $10.00.
43. $1.12½.
44. $1.50.
45. $1.00 to $2.00.
46. $2.50.
47. $2.00.
48. $2.50 to $3.00.
49. $1.50 to $1.75.
50. None sold.
51. $2.50 to $5.00.
52. $1.50 to $2.00.
53. $3.00 for grades, $2.00 for common.
54. $2.00 common, $3.00 for grades.
55. $2.00 to $5.00.
56. $2.00 to $5.00, according to breeds.
57. No answer.
58. $3.00.
59. No answer.
60. $2.00.
61. $3.00.
62. $1.25 to $2.00.
63. $1.50.
64. $3.00.
65. $2.50.
66. $2.00.
67. $2.00.
68. $2.50.
69. $1.25 to $2.00.
70. $1.25 to $1.75.
71. $2.00.

Are lambs sold, and to what extent?

1. One-half are sold.
2. None.
3. Yes. Lambs are sold with the sheep, say 500 per year.
4. None.
5. Lambs are not sold to any extent.
6. None sold, no market.
7. Very few.
8. None.
9. About one-half of the male lambs are sold.
10. But few sold.
11. 5,000 sold to Louisville, Cincinnati and New York.
12. 1,000 or more annually.
13. A great many, 2,000 to 3,000.
14. About 800.
15. Some. Not to any great extent.
16. Not many.
17. None sold.
18. About half the product.
19. Only for breeding and home consumption.
20. Very few.
21. None.
22. No answer.
23. None.
24. None.
25. None sold.
26. None sold.
27. More extensively than sheep.
28. None sold.
29. None that I know of out of the county.
30. $1.50 to $3.50.
31. 3,000 or 4,000 for home consumption.
32. About the half of the product.
33. Not many.
34. Very few.
35. All the early buck lambs at $3.00.
36. Thirty per cent. are sold.
37. No answer.
38. None.
39. None.
40. None.
41. Most of the early at $3.00.
42. Two-thirds are sold.
43. Yes.
44. Very few.
45. A few for breeding.
46. None to butchers, some for breeding.
47. About fifteen per cent.
48. A few.
49. Most of the lambs are sold in June.
50. About 400 or 500 annually.
51. A few for breeding.
52. A limited number.

53. No answer.
54. A few for breeding purposes.
55. None sold.
56. Yes, largely.
57. None.
58. Yes. Do not know to what extent.
59. Yes, probably 5,000, at $3.00.
60. None.
61. Yes, 400 to 500.
62. Very few.
63. Very few.
64. None.
65. Yes, to the full extent.
66. No lambs sold.
67. No, except a few at home.
68. Do not know.
69. No lambs sold.
70. About one-fourth sold.
71. About two-thirds.

What attention is paid to the improvement of breeds?

1. A marked improvement.
2. Considerable attention is paid.
3. Very little for the last five years.
4. This interest is totally neglected in this county, though the finest in the State for sheep raising.
5. There has not been much attention given.
6. Very little.
7. Very little.
8. None of any consequence.
9. A great deal of attention of late years.
10. Very little.
11. All farmers are making an effort to improve.
12. Great attention is now being made to improve.
13. In some sections a good deal, others not.
14. Considerable. The business increasing rapidly.
15. There is getting to be a good deal of excitement.
16. None.
17. Scarcely any at all.
18. Very little.
19. Considerable. Improved breeds are being introduced.
20. Very little.
21. Very little.
22. More than formerly. Improved breeds are being introduced.
23. None.
24. Very little.
25. Considerable the last five years.
26. Considerable interest is being manifested.
27. The desire to improve is rapidly increasing.
28. There is a spirit of improvement manifested.
29. Very little.
30. Almost none.
31. For the last three years considerable going on.
32. Quite a number of farmers are buying improved breeds.
33. Very little except with a few farmers.
34. Just beginning to improve.
35. Flocks generally are being improved.
36. A good deal.
37. Some interest manifested to improve breeds.
38. Comparatively little.
39. Very little.
40. None.
41. Good.
42. Improved breeds are being introduced.
43. Not much.
44. Not much.
45. But very little.
46. Some attention is being paid.
47. Good for the last year or so.
48. More interest is being manifested.
49. A good deal more than formerly.
50. Not a great deal.
51. Very little. The interest checked by the dog law.
52. Very little till of late years.
53. Some little by a few.
54. A few farmers are giving their attention to it.
55. Very little.
56. Very much.
57. Some few are making an effort.
58. A great deal.
59. Occasionally an enterprising farmer buys a good buck.
60. Not much.

61. There is a great spirit for improvement.
62. Of late there is some interest manifested.
63. There seems to be considerable.
64. Very little.
65. Generally very little.
66. But very little.
67. Very little if any.
68. Quite ordinary with a few exceptions.
69. Very little.
70. Some are selling off old stock and introducing new.
71. Not much.

What breeds are preferred?

1. Cotswold.
2. Cotswold and Southdown.
3. Cotswold and Southdown.
4. No answer.
5. Cotswold and Southdown.
6. Cotswold.
7. Cotswold and Southdown.
8. No answer.
9. Cotswold and Southdown.
10. Old stock crossed with Cotswold.
11. Southdown.
12. Southdown and Cotswold.
13. Southdown.
14. Southdown and Cotswold.
15. Cotswold.
16. No choice.
17. Southdown.
18. Southdown.
19. Merino, Cotswold and Southdown.
20. Cotswold.
21. Cotswold and Merino.
22. Formerly Cotswold, now Southdown.
23. No answer.
24. Southdown.
25. Leicester and Cotswold.
26. Cotswold.
27. Southdown and Cotswold.
28. Southdown, Cotswold, Merino.
29. Cotswold.
30. Merino by me.
31. Cotswold and Southdown.
32. Cotswold.
33. Southdown.
34. Cotswold and Southdown.
35. Southdown and Cotswold.
36. Southdown and Cotswold.
37. No answer.
38. Southdown and Cotswold.
39. Southdown and Cotswold.
40. No preference.
41. Southdown and Merino.
42. Southdown.
43. Southdown.
44. There is a difference of opinion which is best.
45. Southdown and Cotswold.
46. Cotswold and Southdown.
47. Cotswold.
48. Cotswold, Leicester, Southdown.
49. Cotswold and Southdown.
50. Cotswold and Southdown.
51. Cotswold.
52. Cotswold and Southdown.
53. Cotswold and Southdown.
54. Merino and Cotswold.
55. Southdown and Merino.
56. Cotswold, Southdown and Leicester.
57. No answer.
58. Southdown and Cotswold.
59. Southdown.
60. Southdown and Cotswold.
61. Cotswold and Southdown.
62. So far with us only an experiment.
63. Southdown.
64. Cotswold and Southdown.
65. Cotswold and Southdown.
66. Cotswold, Southdown and Lincolnshire.
67. So little attention is paid to the matter can't say.
68. Cotswold.
69. People are not generally posted.
70. Cotswold and Southdown.
71. Cotswold and Southdown.

What do you estimate the annual cost of raising sheep per head to be?

1. $1.50.
2. 50c.
3. $1.25, $1.50.
4. No answer.
5. 75c.
6. 50c.
7. $1.00.
8. Do not know.
9. Never made an estimate of the cost.
10. $1.00.
11. $1.00.
12. $2.00.
13. $1.25.
14. $1.25.
15. $1.50.
16. 80c to 90c.
17. Do not know.
18. $1.00.
19. 50c the maximum.
20. No answer.
21. $2.00.
22. $1.00.
23. $1.00.
24. No answer.
25. 50c.
26. $1.50.
27. 33⅓c.
28. $1.00.
29. About what they are worth when raised.
30. Either the lamb or wool will pay the cost.
31. 75c.
32. 75c.
33. 60c to 75c.
34. Very little. Can be grazed till the snow covers the ground.
35. $1.50.
36. $1.00.
37. No answer.
38. Very little.
39. Have never made an estimate.
40. Don't know.
41. 40c.
42. 75c.
43. No answer.
44. 60c.
45. The cost is very little when they have a good range.
46. 50c.
47. 75c.
48. Have never made an estimate.
49. Don't know, not much.
50. 50c.
51. Cannot tell; natives generally take care of themselves.
52. 50c, according to the old plan of letting them run.
53. No answer.
54. About $1.50.
55. About 75c.
56. About $1.00.
57. No answer.
58. About 25c to 50c.
59. $1.00.
60. $1.25.
61. $1.00 on dry food.
62. No answer.
63. 50c.
64. $1.50.
65. 50c.
66. $1.00.
67. 50c.
68. $1.25.
69. From 30c to 60c.
70. No answer.
71. 50c.

What description of feed is generally used, and what particular method employed in feeding?

1. Grass only; a little corn and hay in snow.
2. No answer.
3. Hay, fodder and corn. No particular method.
4. No answer.
5. In winter corn and hay mostly.
6. They run on the vacant land. Little care taken with them.
7. Corn and fodder.
8. Anything that is fed to other stock.
9. Grass, fodder and hay, very little corn.

10. Grain and hay.
11. No feed except in rough weather, then corn and hay.
12. Corn, hay and fodder.
13. Grass and corn.
14. Rye and grass, a little corn at lambing time.
15. Hay and fodder.
16. Run in the woods.
17. Corn and fodder.
18. Corn, fodder and hay.
19. Grazed on clover till December, then on wheat, fodder and hay in bad weather.
20. Sheep run on wheat in fall and winter, clover in summer.
21. No particular feed or method.
22. Not much feeding done. Some feed cotton seed to save hay and corn.
23. Fodder, corn and hay.
24. Pasture in summer, oats and hay in winter.
25. Corn fodder when fed at all; Fed but little.
26. Corn, fodder and hay. Clover hay and corn the best.
27. Cotton seed, corn and oats. No particular method.
28. Corn and fodder; turnips are excellent.
29. Woods pasture. Let the sheep take care of themselves.
30. No particular feed or method.
31. Oats, peas, cotton seed and fodder in winter.
32. Corn, cotton seed and hay. No method.
33. Corn, peas, cotton seed with hay and oats.
34. No answer.
35. Pasture mostly, shelled oats and corn in winter to thoroughbreds.
36. Grass.
37. No answer.
38. Some feed on rye; mostly run in the woods.
39. Some winter on rye, others let run in the woods.
40. No answer.
41. Corn meal, blue-grass, rye, meadow hay, etc.
42. No answer.
43. Oats and fodder.
44. Very little attention paid to feeding; numbers live on the hills.
45. None fed.
46. Such food as they can glean. No method.
47. Hay and corn fodder fed on the ground.
48. Corn and pea hay. The latter is as fine as can be had. We feed on clover and chopped food.
49. Corn and oats. Not much system about feeding.
50. Cotton seed and a little hay and fodder and turnips, raw.
51. But little feed is given; in bad weather hay and straw.
52. The old plan was to let run at large ten months in the year, but we are improving on that.
53. No answer.
54. Corn and cotton seed with hay in winter.
55. Grazing in summer; hay in winter.
56. Oats, bran or meal.
57. Hay and cotton seed and wheat grazing.
58. Summer, pasture; winter, hay and a little corn.
59. Grass and browsing; hay when there is snow.
60. Corn, fodder, hay and oats.
61. Corn and hay.
62. Corn, fodder and hay. No system employed.
63. Grass and hay.
64. Corn, fodder and hay.
65. Not much if any but grass and weeds, some corn fodder.
66. Cotton seed with fodder. No particular method.
67. Corn and fodder.
68. Corn, hay, sorghum seed, oats.
69. They run at large on the plains.
70. Fodder, wheat and bran.
71. Cotton seed and corn and fodder.

What is the average price obtained for unwashed wool?

(These answers were given in 1878 when wool was low.)

1. 20c per pound.
2. 35c per pound.
3. Very little shipped. Home price 25c to 40c.
4. No answer.
5. Do not think that there is any unwashed wool sold.
6. No answer.
7. None sold. Rolls 40c to 65c.
8. No answer.
9. 25c per pound.
10. 20c " "
11. 20c to 25c for Southdown and Cotswold, 18c for scrub.
12. 30c per pound.
13. 18c to 30c, according to quality.
14. Don't know. Last season nearly all sold at 25c to 28c.
15. 35c per pound.
16. 30c " "
17. 30c to 40c per pound.
18. 25c per pound.
19. 25c " "
20. 20c " "
21. 25c " "
22. 25c " "
23. 40c " "
24. 20c to 30c, owing to burs.
25. 30c per pound.
26. 15c to 25c for common.
27. None sold.
28. 35c to 40c per pound.
29. 30c, I believe.
30. 30c the market, almost all wool used at home.
31. 30c per pound.
32. About 18c per pound.
33. 35c to 40c when free from burs.
34. No answer.
35. No answer.
36. 20c per pound.
37. About 22c per pound.
38. 15c to 20c per pound.
39. 15c to 20c " "
40. None sold.
41. 18c to 20c per pound.
42. 23c to 25c " "
43. 20c per pound.
44. 33⅓c " "
45. 20c to 22c per pound.
46. 20c to 25c " "
47. None sold.
48. 20c per pound.
49. 20c " "
50. 20c " "
51. I have sold mine from 33c to 75c for ten years past.
52. 20c to 25c per pound.
53. No answer.
54. 25c per pound.
55. About 40c per pound.
56. 30c to 40c " "
57. 20c per pound.
58. 20c to 45c per pound.
59. 20c per pound.
60. 20c to 25c per pound.
61. 25c per pound.
62. No answer.
63. 25c per pound.
64. None sold.
65. About 25c per pound.
66. 18c to 20c " "
67. 25c per pound.
68. 30c " "
69. 25c to 30c per pound.
70. 30c per pound.
71. No answer.

What is the average yield of unwashed wool per sheep?

1. Native 2 to 4 pounds, Cotswold 8 pounds.
2. 5 pounds.
3. 4 "
4. No answer.
5. 3 pounds.
6. About 2½ pounds.
7. 3 to 4 pounds.
8. No answer.
9. 4 pounds on common, Cotswold more.
10. About 3 pounds.
11. 6 to 8 pounds from Southdowns and Cotswolds; 5 pounds Spanish Merino; 3 pounds scrub.
12. 4 pounds.
13. 3 "
14. 4 "

15. Owing to the kind of sheep.
16. 3½ pounds.
17. About 3 pounds.
18. About 3 "
19. 7 to 10 "
20. About 5 pounds.
21. About 3 "
22. About 3½ to 4 pounds.
23. About 5 pounds.
24. No answer.
25. About 3 pounds common.
26. 2½ pounds for scrub; 6 to 12 pounds for Cotswold.
27. 4 pounds.
28. 3 pounds for scrub; Cotswold and Southdown 5 pounds.
29. About 4 pounds.
30. Native 1 to 3 pounds; Merinos 3 to 12 pounds; grade Cotswold 3 to 7.
31. Common 3 pounds; blooded 5 to 7 pounds.
32. 8 pounds for blooded sheep.
33. Best flocks of common 4 pounds; improved breeds 6 to 8 pounds.
34. No answer.
35. 4 pounds.
36. 3½ pounds.
37. No answer.
38. 3 pounds.
39. 3 "
40. No answer.
41. 8 pounds for improved breeds.
42. Cotswold average 8 to 10 pounds
43. 2 to 3 pounds.
44. 2½ to 3 "
45. From 1 to 3 pounds.
46. 5 to 8 pounds from improved breeds.
47. 3½ pounds.
48. 3½ to 4 pounds.
49. About 4 or 5 pounds.
50. 2 to 2½ pounds.
51. Native 2¼ pounds; Cotswold average nearly 9 pounds.
52. 2 to 4 pounds common; 8 to 12 pounds improved breeds.
53. No answer.
54. Cotswold 12 pounds; Southdown 5 pounds; Merino 8 pounds; scrub 2 pounds.
55. From 2 to 3 pounds.
56. Improved breeds 5 to 7 pounds.
57. 5 pounds improved breeds.
58. 2 to 8 pounds, according to breeds.
59. Average yield 2½ pounds.
60. 2½ pounds.
61. 4 pounds.
62. 1½ to 2 pounds common; 4 to 8 pounds improved breeds.
63. About 3 pounds.
64. 4 pounds.
65. 2 to 2½ pounds.
66. Scrub 3 pounds; Southdown 6 pounds; Cotswold 11 pounds; Lincolnshire 12 pounds.
67. 2½ pounds.
68. 5 "
69. Natives 2½ pounds; Cotswold 7 pounds.
70. Scrub 3 pounds; Southdown 5 pounds.
71. 4 to 6 pounds.

What is the clear income on wool to the sheep?

1. None on native sheep.
2. No answer.
3. 65c to 80c.
4. No answer.
5. About 75c.
6. No answer.
7. About $1.00.
8. No answer.
9. Have never made an estimate.
10. No answer.
11. From 10c to 60c, according to breed.
12. Nothing.
13. Not much. If it were not for the lambs there would not be many sheep raised.
14. No answer.
15. No answer.
16. No answer.
17. Cannot say.
18. No answer.
19. $1.25 per head.
20. No answer.
21. That depends upon the manner they are cared for.
22. 70c to 80c.
23. $1.25 under good management.
24. No answer.
25. On common stock none.
26. 17½c on scrub.
27. 20c.
28. About 15c.

29. Loses half in washing.
30. No answer
31. 60c on common, $1.25 on improved breeds.
32. No answer.
33. Not able to answer.
34. No answer.
35. No answer.
36. 17½c.
37. No answer.
38. 60c to 75c.
39. 60c to 75c.
40. Do not know.
41. 80c.
42. No answer.
43. 50c to 60c.
44. 40c.
45. No answer.
46. What you realize from the wool.
47. About 25c.
48. Do not know.
49. Do not know.
50. 25c. or 30c.
51. Can only answer for myself, Cotswold averaged 9 lbs. last year.
52. Very little on common sheep.
53. No answer.
54. Do not know.
55. From 80c to $1.00 on improved breeds.
56. From $1.00 to $2 00 on fine sheep
57. 50c per head.
58. No answer.
59. About 30c.
60. No answer.
61. No answer.
62. No answer.
63. 50c.
64. Nothing.
65. From 60c to 62½c.
66. No answer.
67. About $1.00.
68. $1.00.
69. It depends upon the breed.
70. No answer.
71. No answer.

What is the average price for lambs to the butcher?

1. $2.40 per head.
2. No answer.
3. None sold to butchers.
4. No answer.
5. $1.50 per head.
6. No answer.
7. No answer.
8. No answer.
9. About $2.00; the past two years $2.50.
10. None sold.
11. $3.50 to $4.00.
12. $3 00.
13. $3.00.
14. $3.00 to $4.00 per head. The money made is on the lambs.
15. $2.00 to $3.00.
16. No answer.
17. None sold.
18. $3.00.
19. $2.00. Very few sold to butchers
20. No answer.
21. None sold.
22. $2.50.
23. $1.50 to $2.00.
24. No answer.
25. None sold.
26. None sold.
27. $2.00.
28. None sold.
29. From $1.00 to $2.00.
30. No answer.
31. $3.00 in early spring.
32. $2.00.
33. $1.00.
34. $2.00 to $2.25.
35. $3.00.
36. $2.00.
37. No answer.
38. None sold.
39. None sold.
40. No answer.
41. $2.50.
42. $3.00.
43. No answer.
44. None sold.
45. $1.00 to $1.50.
46. None sold.
47. About $1.50.
48. $2.50.
49. $1.25.
50. $1.50 to $2.00.
51. None sold.
52. $1.25 to $2.00.
53. No answer.
54. $2.00.

55. None sold.
56. About $2.00.
57. None sold.
58. $2.50 to $3.50.
59. $3.00.
60. None sold to the butcher.
61. No answer.
62. No answer.
63. $1.25.
64. None sold.
65. $2.50 for 60 lb. lambs.
66. No sale of lambs.
67. $1.00.
68. $2.50.
69. None sold to butchers.
70. None sold.
71. $1.50.

What is the average price for stock sheep?

1. No answer.
2. $1.75 to $2.00 per head.
3. Ewes $2.00 to $2.50; bucks $4.00 to $5.00.
4. No answer.
5. From $1.00 to $2.00.
6. $1.50.
7. $1.50; select breeders $5.00 to $15.00.
8. No answer.
9. About $3.00 for two years past; $2.00 heretofore.
10. About $1.50.
11. $2.00 for common, $8.00 to $10.00 for breeding.
12. $2.00.
13. After shearing $2.50.
14. $2.50.
15. $5.00 to $10.00 for breeders.
16. $1.25.
17. $1.00 to $1.50.
18. $1. 25.
19. $4.00 to $5.00 for improved breeds.
20. Very few sold.
21. $1.50.
22. $10.00 for improved breeds.
23. $1.50 to $2.00.
24. $1.50 to $2.00.
25. Fine bucks and ewes $5.00 to $10.00.
26. $1.50.
27. $1.50
28. Scrubs $1.00; blooded $5.00 to $50.00.
29. $1.00.
30. $1 00 to $1.50.
31. $1.50. Fancy prices for imported.
32. $2.50.
33. $1.25 to $1.50.
34. $1 50 to $2.00.
35. $2.50.
36. $2.00, grade $5.00.
37. $1.50, Southdown $10 00, Cotswold $15.00 to $25.00.
38. $1.50 to $2.00.
39. $1.50 to $2.00.
40. $2.00.
41. $4.00 for grade.
42. $10.00 for full blood Southdown, $15.00 for Cotswold.
43. $2.00.
44. $1.50.
45. $1.25 to $1.50.
46. $1.50 to $2.00.
47. $1.75.
48. $1.50.
49. $2.00.
50. $2.00 to $5.00, according to breed.
51. $1.25 to $2.50 for wethers.
52. $1.50 to $2.00.
53. No answer.
54. $1.00 to $1.50.
55. $1.50 to $2.00.
56. Best breeds $5.00 to $7.00.
57. $2.00.
58. Common $1.25 to $2.00, blooded $15.00 to $25.00.
59. $2.00.
60. $1.50 to $5.00, according to breed.
61. $10.00 for blooded.
62. $1.50.
63. $1.50.
64. $1.50.
65. $1.50.
66. $1.75.
67. $1 50.
68. $2.50.
69. $1.00 to $1.50.
70. $1.25 to $2.00.
71. No answer.

What is the average price for mutton per head?

1. 3c per lb.
2. No answer.
3. $2.00 to $2.50.
4. See remarks.
5. $2.00.
6. $1.75 to $2.00.
7. $1.00 to $3.00.
8. $1 50. See remarks.
9. $3.00.
10. $1.75.
11. $3.00 to $4.00.
12. $5.00.
13. $4.00 with the wool on.
14. $4.00.
15. It varies according to the quality from $2.00 up.
16. $4.00 to $5.00.
17. 3c to 3½c per lb.
18. $2.00.
19. $3.50 to $4.00.
20. $3.00.
21. $2.00.
22. $2.50 to $3.00.
23. $2.50.
24. $2.00 to $2.50.
25. None sold.
26. No answer.
27. $2.00.
28. $2.00.
29. $2.00.
30. 3c per lb. gross.
31. $3.00.
32. $3.00.
33. $2.00 to $2.25.
34. No answer.
35. $3.00.
36. No answer.
37. No answer.
38. $2.50 to $3.00.
39. $2.50 to $3.00.
40. $2.00.
41. $2.25.
42. $5.00.
43. $2.00.
44. $2.00 to $2.50.
45. $1.00 to $2.00.
46. 5c per lb.
47. $2.00.
48. $3.50.
49. $1 50 to $1.75.
50. $2.25.
51. $2.50 to $5.00.
52. $1.50 to $2.50.
53. See remarks.
54. $3.00 to $5.00
55. $2.00 to $2.50.
56. $3.00.
57. $2.50.
58. $3.00 to $4.00.
59. $2.50.
60. $2.50.
61. $3.00 for good wethers that will weigh 70 lbs.
62. No answer.
63. $2.00.
64. $2 00.
65. $2.25 to $4.00.
66. $2.25.
67. $1.75.
68. 5c per lb.
69. $2.00 to $3.00.
70. No answer.
71. $2.00.

Have you a home market for your wool? If not, what is your nearest market?

1. Sold here but consumed out of the county.
2. No answer.
3. All consumed at home.
4. See remarks.
5. None at home, send to Humphreys county.
6. The most is used at home.
7. Yes.
8. Entirely used at home.
9. Sent to Franklin or Nashville.
10. Consumed at home.
11. Some sent to Kentucky and the North.
12. Sold to agents of manufactories.
13. Generally sold at home.
14. Send the most of it to Bowling-green, Ky.
15. Have a tolerably good market at home.
16. Yes.
17. We have a home market.
18. Sell to the factory at McMinnville.

19. Two fine mills on Red river, near State line.
20. Exchange our wool with factories on Red river.
21. No home market.
22. Home market.
23. Home market.
24. We can sell at home or sell at Mayfield factories.
25. No home market, Nashville the nearest.
26. Knoxville our market.
27. Exchange with mills at Humphreys county for goods.
28. Consumed at home.
29. Sell at Knoxville.
30. Our markets are North and East.
31. Sell to go out of the county; no factories.
32. But little sold at home. Ship to St. Louis.
33. No home market, sell to Humboldt and Hurricane Mills.
34. None.
35. Home market.
36. No home market.
37. Home market.
38. No home market; Cincinnati and St. Louis.
39. No home market; St. Louis and Cincinnati.
40. None sold.
41. Home market for one-third.
42. Can sell at home or to factories.
43. Yes. Knoxville.
44. The factories at Elizabeth buy our wool at 50c per lb.
45. We have.
46. No home market.
47. We have a home market.
48. Most consumed at home.
49. We have a home market.
50. We have none; ship to different places.
51. No home market. I ship to Boston, Mass.
52. None. Hurricane Mills the nearest market.
53. No answer.
54. Some little home demand. Louisville and Philadelphia.
55. Not enough raised for home consumption.
56. We have the factories at home and McMinnville.
57. Humboldt factory the nearest. Ship to St. Louis.
58. Nashville our market.
59. Yes, we have a home market.
60. The most of our wool is sold in Knoxville.
61. Good home market.
62. Not wool enough for home use.
63. We have.
64. We have no home market.
65. No. Nashville.
66. Have no home market.
67. Home market for all we make.
68. Home market. Clarksville.
69. Most merchants buy wool.
70. Knoxville.
71. None raised for market.

Are there any woolen factories in your county. If yes, how many and where located?

1. None.
2. One, in the northern part of the county.
3. None.
4. No answer.
5. None.
6. None.
7. None but carding factories.
8. None.
9. Do not know.
10. None.
11. Two, one in Gallatin and one five miles from it.
12. Two, one in Gallatin and one at Desha's creek.
13. Two, one in Gallatin and one at Desha's creek.
14. Two, one in Gallatin and one at Desha's creek.
15. Four, two at Bristol, two at Elizabethtown.
16. None.
17. None.
18. None.
19. None known to us.
20. None.

21. None.
22. None, three or four carding factories.
23. None.
24. One.
25. None.
26. One on Eastamantor creek.
27. None.
28. None.
29. None, carding mills only.
30. None.
31. None in Madison.
32. None.
33. None.
34. None.
35. None.
36. One in Fayetteville.
37. One at Marcella Falls.
38. None.
39. None.
40. None.
41. None.
42. None, some carding factories.
43. One near or at Morristown.
44. None.
45. None.
46. None, some carding machines.
47. One at Big Hurricane creek.
48. Ours is all we know of.
49. One at Hurricane creek.
50. None.
51. None.
52. None, some carding machines.
53. No answer.
54. None, one near the line in Florence.
55. None.
56. One at Dowelltown.
57. None.
58. None.
59. None that I know of.
60. None.
61. One at Tullahoma.
62. None, some carding machines.
63. None, but one at McMinnville near our lines.
64. None.
65. None.
66. None.
67. None.
68. One on the west fork of Red river.
69. None.
70. None.
71. No answer.

What is the estimated amount of capital invested in sheep in your county?

1. $50,000.
2. $6,000 to $10,000.
3. No answer.
4. About $6,000.
5. No answer.
6. Very little, cannot give the amount.
7. None.
8. Do not know.
9. About $7,000 or $8,000.
10. $50,000.
11. $20,000.
12. Cannot answer.
13. About $40,000.
14. No answer.
15. No answer.
16. $30,000 to $40,000.
17. $3,000.
18. $20,000.
19. $3,000.
20. $3,500.
21. $25,000 to $30,000.
22. $7,500.
23. No answer.
24. Not over $15,000.
25. No answer.
26. $10,000 to $12,000.
27. About $24,000.
28. About $6,000.
29. No answer.
30. $5,000.
31. About $20,000.
32. About $40,000.
33. Unable to answer.
34. Very limited.
35. $100,000.
36. Do not know.
37. No answer.
38. $10,000 to $12,000.
39. $10,000 to $12,000.
40. None.
41. $900.
42. $75,000.
43. No answer.

44. About $12,000.
45. Very little.
46. Very limited.
47. About $30,000.
48. Do not know.
49. Do not know.
50. About $5,000.
51. Cannot answer.
52. $15,000 to $20,000.
53. No answer.
54. $7,000 or $8,000.
55. $3,000 to $4,000.
56. No answer.
57. About $10,000.
58. No answer.
59. No answer.
60. About $10,000.
61. No answer.
62. No answer.
63. $10,000.
64. $12,000.
65. None.
66. No answer.
67. Cannot answer.
68. Do not know.
69. Can't tell.
70. No answer.
71. Don't know.

What is the estimated number and value of sheep annually destroyed by dogs?

1. Half a dozen farmers present estimate the number from 300 to 1,000.
2. About one-fifth annually.
3. Cannot give any estimate.
4. No answer.
5. About 800, worth $1,600.
6. One-fourth.
7. None since the dog law was passed.
8. No answer.
9. In the last three years but few, but previously one-fourth.
10. About one-half of the whole amount.
11. 200 in this county. Must now increase.
12. 500.
13. A great many, don't know the number.
14. Don't know, less the past season than ever.
15. About one-fourth.
16. No answer.
17. About 25 per cent. of the whole.
18. 50 sheep valued at $62.50.
19. About 10 per cent.
20. About 1,000, value $3,000.
21. 5 per cent.
22. No answer.
23. 100 head.
24. 10 per cent.
25. About 200 or 300.
26. 500.
27. Very few.
28. Very few since the dog law was passed.
29. No answer.
30. One-half to three-fourths of the whole number.
31. 10 to 20 per cent.
32. 10 per cent.
33. Not less than 20 per cent.
34. 10 to 15 per cent.
35. No answer.
36. $2,500 in value.
37. Do not know.
38. 10 per cent.
39. Very few recently.
40. About 10 per cent.
41. About one-fourth.
42. 25 per cent., valued at $15,500.
43. No answer.
44. A very considerable number.
45. 100, value $125.
46. 1,000 for this county.
47. About 10 per cent.
48. Cannot answer, know it to be large.
49. Cannot say.
50. Cannot give the number, think it great.
51. Cannot answer.
52. Very considerable.
53. No answer.
54. Very few while the dog law was in force.
55. Aout one-third of the whole
56. 300 to 500 a year.
57. No data, number large.

58. From 5 to 10 per cent.
59. No answer.
60. 500 head valued at $1,500.
61. 200 to 300 head.
62. No answer.
63. 400 head, value $600.
64. Very few since the dog law was passed.
65. None reported since repeal of dog law.
66. 50, value $100.
67. 500 to 700, worth $1,000 to $1,400.
68. Recently not many, perhaps 15 per cent.
69. It has been 20 to 25 per cent. this year.
70. No answer.
71. No answer.

Do you know any person who has abandoned the raising of sheep on account of their destruction by dogs?

1. Yes, John Connon, Bellbuckle.
2. No answer.
3. Not any.
4. No answer.
5. Cannot say.
6. No answer.
7. One or two.
8. Yes, a great many.
9. A great many persons would have small flocks but for the dogs.
10. One-half of those now engaged in it intend to do so.
11. Yes, Captain Tompkins and Mrs. Drake.
12. Yes.
13. A great many.
14. A great many are going back to it as it pays well
15. I hear some threatening to do so.
16. None.
17. I do.
18. I do not.
19. Fully half of the farmers have quit.
20. No answer.
21. No answer.
22. Yes, frequently hear persons say they will.
23. None.
24. Yes, several.
25. Do not.
26. Not many.
27. None.
28. Some would have gone into the business but for the repeal of the law.
29. Yes, several.
30. I do.
31. Lots of farmers.
32. None.
33. I do for I am one.
34. Yes.
35. Fear of dogs prevents large investment in sheep.
36. Do not.
37. Yes, several.
38. Very few if any.
39. Yes, others are deterred by dogs.
40. No.
41. No.
42. Yes, several.
43. A few.
44. No, many are deterred from fear of them.
45. No answer.
46. Yes, some commenced the business and abandoned it.
47. One or two.
48. Yes.
49. Yes, several.
50. I do not, I think many are deterred from fear of dogs.
51. Yes, others would like to go into the business but are deterred by it.
52. Could name several.
53. No answer.
54. Not altogether, but several have reduced their flocks in consequence.
55. Many.
56. Do not.
57. Quite a number.
58. Quite a number.
59. Several, and hundreds are afraid to.
60. Yes.
61. I know of a few.

62. Some say if it were not for dogs they would go into the business.
63. Yes.
64. No.
65. None.
66. Yes.
67. Yes, quite a number.
68. It prevents many from following it as an occupation.
69. No.
70. No.
71. Yes.

CHAPTER XIV.

CONCLUDING OBSERVATIONS.

In compiling this little book, I have drawn largely upon the judgment and experience of the most intelligent and successful sheep raisers in this country and of Europe, in order to make it a book of reference for such of our farmers who have not access to, or the leisure and opportunity to consult the works of so many and varied authors.

Some persons object to what they call "book farming." What is book farming but the combined wisdom and knowledge of the men who have given the subject the most careful investigation and attention. As well might we exclude books of instruction from our schools and colleges, if our youth can teach themselves the arts and sciences without them. How often do men cling to a false theory, or continue to pursue a wrong method of conducting their business all their lives, for the want of a proper knowledge and understanding of the true ones? It is a matter of almost daily occurrence for persons to bring specimens of worthless rocks to this office to be analysed, supposing, from some little shining particles they contain, they must contain some of the precious metals. A little knowledge of geology and mineralogy would have taught them better and saved them the loss of a good deal of time and trouble, besides disappointed hopes and expectations. We must have brains on the farm as well as muscle—brains to plan and direct, muscle to execute, an instructive as well as executive department. The two cannot be successfully united to any great extent. The man who toils and sweats at the plough through the long summer's day, though he might wish that he could find some easier method of turning over the sod, would

never work out the problem which the Duke of Sutherland did in his closet, of using the most powerful agent known to man—dynamite—for that purpose. Physical force must always succumb to brain force. The laborers and mechanics opposed one by one the new inventions as fast as they came out for lessening the manual labor in the mechanical arts, but they soon found, that instead of throwing them out of employment, they found better in other directions. The seamstress found that instead of losing her work through the introduction of the sewing machine, she could make more money with one in one hour than she could in a whole day by sewing by hand; so through all the departments of labor.

Let us then, not despise knowledge obtained from books, which are the only channels through which man can elevate himself above the mere instincts of brute creation, and bring himself to the knowledge of the living God who created him in his own image, and will hold him responsible for the talents committed to his care.

I cannot close my labors without making one more effort to awaken our farmers to a sense of the necessity of throwing off their lethargy and supineness, and infusing more life and energy into their occupation. "A man's heart should be in his vocation." The flock-master should *love* his sheep, and feel an interest in them akin to that of his own children, else he had better abandon the attempt at raising them. What would be the condition of our manufacturing interests to day if no more life and enterprise had been infused into them than we find in our agricultural departments? Would they have been able to compete with the skilled artisans and mechanics of Europe?—nay, to have almost shut their manufactures out of our markets, and even undersell them in many of their productions in their own. Is there less skill required in agriculture than in the mechanic arts? Agriculture is a science of the highest order, and no man will succeed in it who does not so regard it. All our great Southern statesmen and orators were agriculturists, and they

thought it not beneath them to devote the same abilities to their home occupations that they carried with them into the forum; doubtless, much of their inspiration was drawn from their constantly communing, when at home, with nature and nature's works. History tells us that the great Roman Empire did not begin to decline till her patriots and statesmen forsook their landed estates to dwell within the narrow confines of walled cities. Let our landed proprietors look to it in time, lest a like calamity should befall our own country, for history is constantly repeating itself among all nations.

Instead then of lounging and loafing around our inland towns, telling the news of the day and laughing at anecdotes, let our men who own lands resort to them and engage in the beautiful occupation of the agriculturist in some one of its many branches. It is not to be expected that many persons will devote themselves wholly to sheep raising, as our farming is, as a general thing, of a mixed character. But the object of these pages is to teach those who wish to raise a few sheep as well as those who wish to make it a specialty.

There are so many advantages in having a few sheep on every farm that the reader must pardon us for making a resume of them, with the hope of impressing its importance on some few of our many farmers who are without them. They add to the comfort of the poor man, for it gives him the means of clothing his family warmly, and since the abolition of looms every observant man will see the shabby manner in which many of our farmers are clad. When the good housewife held sway over the clipping of her sheep, she, with the daughters of the family, could find no better occupation, during the long, tedious winter night, than to spin and reel the fleecy rolls from the carding factory. A willing hand and a cheerful spirit come of employment, and soon the supply is hanging on the walls in the shape of hanks of fine or coarse wool, some for wearing and other for knitting. A few days are only required to convert these

hanks into good warm jeans or calamanca, a four treadle jeans.

In addition to the benefit of clothes, a small flock of sheep will supply a sweet and toothsome food when satiated with the briny fries of bacon. Nothing eats like lambs of our own raising, and lamb and peas is a dish fit for kings. How much better when it does not come from the butchers. In fact, when the butcher has to supply it, it seldom makes its appearance on the table. But from our flock it can obey the will of the farmer, and a regular interchange of slaughter between farmers will keep fresh meat as often as required, without the danger of spoiling from the heat of summer. The surplus wool gives a convenient supply of pocket change, (we are speaking of small flocks), at a time of the year when the farmer has no crop to sell. The peculiar fitness of wool for market is shown by its ease and cheapness of transportation. It can be sent to any market at but a slight cost. Nothing in agriculture is so easily carried to market without injury and so cheaply. It can be carried from San Francisco to New York for one and one-half cents per pound, while wheat or bacon would cost its entire value to transport it so far. There are important considerations in selecting a product of agriculture. It gives great facilities for the home and brings the foreign markets into competition. It must be kept in mind, however, that wool will not bear baling for transportation like cotton. Its fulling property prevents that. If baled, it might become so inextricably tangled in the fulling process that it would be worthless. The fibres of wool are different from hair. While the latter has bristled or barbs on its sides, the wool is made precisely like a stack of thimbles let into each other, and the edges of the thimbles have beards by which they stick to each other fibre by these hooks. While the wool is ordinarily pressed, these hooks do not get hold of each other, but if brought together very firmly, and especially if rubbed, these little hooks will catch into each other in such a manner they

can only be separated by cutting up. The wool hat is an instance of the fulling process. It is one of the most interesting items in regard to wool to recapitulate the many purposes to which it is applied. It goes into every form of clothing for man and woman. The finest gauzy fabrics of female wear are made of the same material with the coarse, heavy shoddy of the hod carrier. It covers our feet, hands and heads; it covers our floors and beds. There is scarcely a single article of commerce, from gun wads to the heavy cordage of ships, but has wool in its construction. With all the uses to which it is applied there will never come a time when it will not remunerate the producer.

Again, every one knows that land must be renewed or it will cease to be productive. I take the broad ground that nothing will renew lands cheaper and more effectually than sheep.

England has 32,000,000 sheep, and Scotland, much smaller than Tennessee, with more mountains than any State in our Union, has 5,000,000. They are kept in such quantities chiefly on account of their fertilizing qualities. The population of that country is so enormous that the land is taxed to its utmost capacity to feed its citizens, and without sheep it would fall still further behind than it does. They do not destroy the grass roots like other animals, their bite being sharp and light. They dispense their manure evenly over the surface, so that all alike is benefitted. The sheep will consume and finally eradicate from the soil all noxious weeds, there being but few that are not eaten by them. And, by the way, it is a well known thing that ivy or laurel will kill sheep eating it. There is a great deal of it growing in mountainous countries, and they must be guarded from it. A gentleman of Davidson county informs me that he lost a fine flock of sheep from eating the common ground ivy common to all damp woods. This must not be confounded with the former ivy or sheepkill as it is called, also called calico bush. It is a laurel (*Kalmia Angusti-*

folii) and is well known as a deadly poison to sheep and cattle.

Taking all these facts into consideration, we feel that we can commend this industry to all classes of people, alike to the landlord and renter, to the owner of a few acres and to the plantation of the once wealthy farmer, who, having lost his laborers, can put the sheep to work to repair the damage of years upon his exhausted lands.

To encourage the raising of sheep the last Legislature enacted a very wise law and one that will redound to the welfare of the State. This law allows every farmer to own fifty sheep exempt from execution for debt. It is unfortunate that their ideas of the rights of property did not influence them to enact a law for the protection of flocks against the ravages of roaming dogs.

CHAPTER XV.

ANGORA GOATS.

Angora goats resemble sheep more than any other animal in their habits of herding and feeding, as well as in the usefulness of their outer coating and in the excellent qualities of their flesh. I have thought, therefore, that a chapter devoted to their management may not be unacceptable to the farmers of Tennessee. The farm can have no scavenger equal to a flock of goats. However thick the briers or tangled the undergrowth, a flock of goats will quickly destroy them, and no food is so highly relished by them as that which is utilized by no other domestic animal. For clearing up the underbrush of a woodland pasture, a flock of goats is equal to as many laborers, and they will thrive and fatten on their labor. The flesh of the goat is very palatable and healthful, and the cheapest which can be produced. Mr. Stratton, of Cumberland county, whose letter is included in this chapter, informed the writer that the cost of raising a goat is not as much as the cost of raising a chicken.

Half a century ago the Angora goat was unknown in America. For a century the existence of cashmere shawls was known, and in high life the possession of one ranked in importance with the possession of a diamond, and was transmitted with equal care from mother to daughter. The brilliancy and fineness of the texture and the high prices which these shawls commanded, led enquiring minds to an investigation of the subject. So rare a fabric, it was argued, should not be unknown in its method of manufacture to the skill and intelligence of the western world. The semi-barbarians of mid-Asia should not be permitted to bring to

ANGORA GOATS.

shame the finest and costliest textile fabrics of civilized Europe and America. For many years the texture, even, of these costly shawls was unknown. It was believed that they were made of a fine wool, but examination of the fibres disclosed the fact that it was not wool at all, but hair; and then speculation ran wild as to what animal produced such a silky, glossy coat. The manner and method of manufacture were equally unknown, and it was many years before the public was enlightened on these subjects. Even after the origin was made public, it was still many years, in spite of the most strenuous efforts upon the part of individuals and of governments, before the possession of a single animal could be obtained, so jealously was their exportation guarded by the shepherd kings of Asia. It was too fruitful a source of revenue to those nomadic people to be tampered with. Time and patience finally overcame their scruples, though the first animals imported cost fabulous sums. They not only had to be paid for at enormous prices, but had to be transported about 1,500 miles over desert and mountain, where no convenient railway offered its services. The hostility of the Arab tribes had to be encountered all the way, and their prejudice had taken such deep root that every individual made efforts to thwart the purpose, and it was only after the most incredible hardships and dangers that at last a few goats were landed on the shores of America.

Dr. J. B. Davis, of Columbia, South Carolina, has the high honor of having been the first man who brought any here, he having, while consul to Turkey, secured nine thorough blood animals from Thibet, and landed them at last, after many difficulties, in his native city. So valuable were they, that he readily sold the produce of these animals at from one to three thousand dollars a pair.

Various attempts have been made, both in Europe and America, to manufacture these shawls, but with little success, the water and atmosphere of Asia being necessary to

impart the brilliant colors for which they are so famous. England long enjoyed a monopoly of the trade in cashmere shawls, and through the selfishness of the London importers much of the difficulty of importation was due.

There are two species of goats famous for the character of the fleece. The Thibet goat is the true cashmere shawl goat, but the distance is so great and the difficulties of obtaining them so numerous, they are almost unknown to our stock men. In Asia Minor is a vilayet called Angora, of which Angora is the capital. A species of goats called, from this city, Angora, now are found, that so much resemble the true Cashmere that only experts are able to distinguish them, and these have come into general use in America. The fleece is as good and equally as valuable, but there are some insensible properties in the Cashmere that are of but little practical importance, hence the Angora has superseded to a great extent the Cashmere. Dr. Scott, whose able treatise we have used with his consent, says that Dr. Davis brought over the Angora, while the Cyclopedia of the Appletons says they were the Thibet goat. Be that as it may, the price of a full-blooded buck is so greatly reduced that almost any farmer can avail himself of one, and by crossing one of these "bucks" with a flock of the common goat, a fine character of cashmere wool, as it is miscalled, can soon be obtained; in fact, after five crosses the fleece cannot be distinguished from the pure bred animal. We hardly think our progressive people, however, can ever be got into the manufacture of those famous shawls, as it requires from one to five years work with several looms to make a single shawl. Labor is so cheap in that overpopulated country that good workmen can be obtained at a cost of a few cents a day, and only merchants can engage in the work, as the laborer can get nothing until his shawl is completed, and therefore must be fed by the employer while engaged in its construction. There are many other uses to which the wool can be applied, and it is gaining more

popularity every day, and the time will come when much of our woolen fabrics will be made of it.

For further information, we refer the reader to the article of Dr. Scott, to that of Joseph Phillips, of Davidson, and to Mr. Lorenzo Stratton, of Grassy Cove, Cumberland county. The latter gentleman seems to think—and his opinion is based upon experience—that they are peculiarly suited to the Table-lands of the Cumberland Mountains. That they can be raised much cheaper than sheep will not admit of a doubt, and it is only the question of sales that has to be determined.

THE BREEDING, MANAGEMENT AND PRODUCTS OF THE CASHMERE, OR ANGORA GOATS.

[By Robert W. Scott, Frankfort, Ky.]

After maturely studying the history, and a careful inspection of the persons of these animals, during several years, I purchased a flock of them in May, 1860. I was impressed that an animal so hardy and prolific, producing a textile product so rare, so durable, so beautiful, and so valuable, must soon become of great practical importance in a country of so much wealth and taste as ours. I was specially impressed with the facility and certainty with which the males of this breed transferred all of their superior qualities to a lower and common species of the same class of animals, by being carefully bred to the females of the lower class for five or more generations, the improvement commencing promptly and palpably with the first cross, and plainly manifest in each succeeding one, until in five or more crosses the inferior blood was almost lost in form, and fleece, and character.

This feature assured me that in a few years fine wool or mohair could be produced from pure and from cross-bred animals sufficient to justify the erection in this country of manufactories of the product, until which time the animals

would have to be bred for their prospective value, and for fancy articles mainly. A fratricidal war delayed, but could not divert, the consummation. Several manufactories have already been established. The demand, at remunerating prices, is greater than the supply; and the wool of cross-bred animals during several generations proves to be equal to any for many of the purposes of use or ornament, and we are assured that we may now enter confidently upon this new and promising field of industry.

PRACTICAL INFORMATION CONCERNING THEM.

To those who contemplate entering upon the breeding of these animals, a few remarks, derived from careful reading, and from practical experience during near twenty years, may not be uninteresting.

A SKETCH OF THEIR HISTORY.

Though the goat has not long been practically known as a wool-bearing animal in the United States, yet it is inferable, from their hardier nature and better adaptation to pioneer life, that it supplied our remote ancestors with both clothing and food long before the sheep was used for these purposes. Certainly from the earliest history of our race it has been intimately and practically associated with man, and in some Asiatic countries still contributes to his requirements more than sheep. The race abounds in almost infinite varieties, which have readily adapted themselves to the climates, subsistence and culture, to which they have been subjected, in almost every habitable portion of the globe. They were regarded by the ancient Israelites as clean beasts, were esteemed as choice food, and were consecrated to sacrifice. Certainly ever since, and probably long before Moses ordered one hundred and sixty-five yards of the cloth of "goat's hair" to be made for the veil or covering of the Tabernacle, the wool-bearing goat has been known and used by the Asiatic people, and the animals still

greatly abound in several countries of that quarter of the globe. It is strange, therefore, that they were not much earlier introduced into our country.

THEIR IMPORTATION INTO THE UNITED STATES.

This honor was left to Dr. Jas. B. Davis, of South Carolina, in the year 1849, since which several other importations have been made. As Dr. Davis was our Consul to Turkey when he exported them, and as Smyrna, or Constantinople, was their port of debarkation, it is probable that he availed himself of the advantages of his official position to secure the variety known as Angora goats, called so from the city of Angora, in the province of Natolia, in Asia Minor, where they are extensively raised, and their wool was once more largely manufactured.

Another wool-bearing goat is extensively raised in Thibet, in Central Asia. Its wool is exported to the small province of Cashmere, where it is manufactured into the richest and most beautiful fabrics, which have given wealth and fame to that little interior country all over the world. As it is not known that any of these have ever been imported into the United States, those which we have should, in strictness, be called *Angora* and not *Cashmere* goats. Though there is some discordance in the history of the importation of these animals and of their breed and nativity, yet the name *Angora* is now generally accorded to them, and their descendants from the flock of Dr. Davis, it having been acquired many years since by Col. R. B. Peters, of Georgia. Several other importations also have been made at divers times, among the animals of which there is a general uniformity, though with some discrepancy as to size, color and fleece; and the fullest description of them has been given by Hon. J. S. Diehl, in the U. S. Agricultural Report for 1863.

DESCRIPTION, CHARACTER AND HABITS.

As they have been so often illustrated in agricultural publications, a *personal* description of them is not here important. In size they are superior to the native or common goat. Wethers, when fully grown and fatted, will weigh from sixty to eighty pounds, live weight. A wether of my flock, two years old, has weighed, when dressed, fifty-four and a half pounds net—the fore quarters 18 pounds, the hind quarters 21 pounds, the saddle 12 pounds, and the rendered tallow 3½ pounds; the tallow much more in some other cases. The color of pure bred and full-blood animals is almost invariably white, though some of the earliest descendants of imported animals were brown; some being gray and some black, also, in their native country, varying a little, perhaps, in species, or family of species. Their gay and intelligent appearance, their cleanly habits, active and playful disposition, make them attractive on a farm; while in their nature they are so docile that they may be raised so as to be as familiar about the house and yard as the dog or the cat. Though they have great curiosity and enterprise, they also have strong local attachments, and after wandering all day, will generally seek their usual shelter at night, especially if the weather is inclement. They do not break fences, or clear them at a single bound, as most other stock do, but will pass through a hole which is already made, will climb up a rail which leans at about forty-five degrees, or will bound on top of, and then over, a low fence. Any good farm fence five feet high, except stone fence, will keep them securely. Like other stock, they are more troublesome after they have acquired roaming and breachy habits. They bear coupling, hobbling and tethering better than any other stock.

In their diet they are almost omnivorous, eating in winter often what they have rejected in summer. On large farms much the greater portion of their diet will consist of

weeds, bushes, briers, fallen leaves, brush, etc., and they are truly valuable for keeping lands clean of these. In winter short grass and corn-fodder is all that is required, even by the breeding flock, and I have never found it necessary to feed grain of any kind to them at any season.

A dry shelter is desirable for them, especially to the females in kidding season; though my flock of males and wethers, even after they have been shorn in April, has never had any protection than what they could obtain around a hay or straw stack.

The females have no perceptible odor at any season, and the males only during the breeding season, when they urinate on their fore legs and beards; but their habits and odor are much less offensive than of the native goat; and their language of love is much less demonstrative and noisy.

In breeding they are precocious, the females being capable of breeding at seven months, and the males of propagation still earlier. As the females carry their young only five months, it is possible for them to have young within twelve months old; but I do not think it advisable that either sex breed in less than twelve or eighteen months old. Generally the *pure-bred* animals have but one at a birth; while grade and full-blooded females will have from one to five, and with reasonable care will always raise as many kids as there are mothers in the flock, and often more. If the weather is pleasant, and the kids, at their birth, can once get dry, and stand up and suck, they require but little attention afterwards. The mothers may sometimes lose or leave them in large pastures, especially if they have more than one, when they are very young. Like deer, they incline to leave their young, and return to and suckle them at intervals, during the first few days after birth. A protracted cold rain is often fatal to a kid at the time of its birth; it is therefore desirable to house the females at night, during the period of parturition. The males should be bred to the

females, so that the kids will come in pleasant weather, and as simultaneously as possible, for which, and other reasons, it is preferable, commonly, to keep the adult males and wethers separate from the breeding flock. The bucks are said to be valuable in protecting the flock from the attacks of dogs, and under my observation the goats are most commonly the attacking party, having seen them frequently charge and drive away a loafing dog. They do not, by flight, invite the pursuit of dogs, as sheep do; and dogs do not seem to have the same disposition to worry or to eat them, which they manifest towards sheep.

Though goats will often bite, hook, and butt each other, yet they are not cross with other stock, and the males do not fight and injure each other as male sheep often do.

DISEASES AND INSECTS TO WHICH THEY ARE SUBJECT.

Though I have been breeding these animals nearly twenty years, and once had over two hundred head of them of all ages, yet there has never been any epidemic disease among them. During this time I have lost several by worms in the nose, as with sheep, and one by a swelling of the glands of the throat. A humor in the cleft of the foot, like scratches in horses, has given me more trouble than all other diseases. It is caused by wading through high, wet grass, yields readily to strong acids, and never kills. Wash the sore repeatedly in carbolic soap suds, or in turpentine, and then apply a salve made of bluestone, or copperas, or tar. A variety of small, long, red vermin is peculiar to them; is not fatal, and can be destroyed mainly by preparations of tobacco, cresylic soap, or camphor, sulphur, etc., applied along the back. The great peculiarity of the

ANGORA GOAT IS ITS FLEECE, OR RATHER ITS FLEECES.

The hairy covering of all goats is known in commerce as *mohair*, both the long wavy fleece of the Angora, and the shorter and finer, silky, under hair of the true Cashmere

goat, which is obtained by combing it out. Like some furred animals, the Angora goat wears two distinct and different suits of clothing, and mainly at different seasons. One is short, stiff, coarse, and of no commercial value; the other is long in proportion to the degree of blood, and is lustrous, soft, silky, and elastic. The animal is born with a covering of the first, which in a few weeks drops out, and is simultaneously replaced by the second, or the fine wool, which in its time also drops out, and is similarly superseded by the first; the animals wearing the short, coarse hair in the spring and early summer, and the long fine wool in summer, fall and winter. When the wool of the Angora goat is being shed, the cups or bulbs in the skin which produced the fibers are also shed, as well as the cuticle or outside skin. This is a great peculiarity of the Angora goat; but a still greater one, and of far more practical importance, is its capacity to transfer, or to impart this rare quality to other goats which do not possess it. The males certainly have this power in a high degree: and the female Angora bred to a common male, will no doubt impart the same quality, but probably not in so high a degree. The kid of an Angora buck, out of a native ewe, invariably has in its skin those bulbs or cups which produce and secrete the fine wool of the Angora, or wool-bearing goat, while it has the power to secrete the hair also, as its ancestry, on the dam side, always had. The wool of goats is finer, longer, or thicker in different individuals of the same blood, just as is the case with sheep; and like sheep, also, the same animal produces finer wool when young than when advanced in life. But the wool of the half-blood kid or goat is of a standard *fineness* of full-blood or of pure-bred Angora goat's wool, but it is short. The *wool* and the *hair* of the half-blood grow together, and seem to constitute but one covering; but a close inspection shows the different fibers, issuing from different bulbs in the same skin; and when the shedding season arrives, the fine *wool* may be combed out of the *hair*

on the animal's back, and on being separated from it, bears a close resemblance to the finest fur, or to Saxony wool, and is especially like the true Cashmere mohair, out of which the most valuable shawls, etc., are made. A friend who was traveling in Asia sent me a sample of mohair, which exactly resembles this fine *wool* of the first cross, having also some of the coarse *hair*, and of the cuticle in it, showing that it had been shed, and not shorn. The two products of the half and of the three-quarter blood being nearly of the same length, they cannot be separated by shearing, and to gather it by combing it out of the hair on the backs of the animal is too tedious. The specimen to which I have alluded is most probably the product of some other species of wool-bearing goat, and not of a half-blood cross of different species, and is doubtless the pure Cashmere.

If the half-blood female kid is bred to a pure Angora buck, the product will be similar, except that the wool will be longer in proportion to the degree of Angora blood; and sometimes long enough to be separated by being shorn from the animals so as to be cut over the ends of the coarse *hair*. The *wool* will be long and fine enough for many uses in manufacture, but there will generally be so much of worthless hair in it as to make it of little value. On animals of the third similar cross, or of seven-eighths Angora blood, the fine *wool* will always be so much longer than the *hair*, that it admits of practical separation in shearing; and so of those of the fourth cross, while those of the fifth cross, and above it, bear *wool*, which, in every essential particular, resembles that of pure bred or imported Angora goats, and admits of application to all the uses of the best imported mohair, or of home raised *wool* from pure-bred animals, though it is always liable to have some hair in it.

WILL FULL-BLOOD BUCKS PRODUCE THIS WOOL WHEN BRED TO NATIVE FEMALES, SIMILARLY AS WITH PURE-BRED BUCKS?

This question has been affirmatively settled by the experience of every breeder of Angora goats in the United States, so far as I have ever known or heard, yet while similarly yet not so perfectly as by pure-bred males; the fleeces which are produced by the full-blood bucks being more subject to long and coarse hairs in them, than those which are the product of pure-bred bucks. But the question is no longer of practical value, since the pure-bred animals have become more common, and the price of them has been reduced.

The experience of breeders and of manufacturers has also well established the practical value of the mohair produced by crossing the pure-bred bucks on the native females for five or more times. About ten years since thirty-six fleeces of my clip of 1868—two only of which were pure-bred, and many less than full-blood—were forwarded to Messrs. Bauendahl & Co., Nos. 45 and 47 Park Place, City of New York, which were sent by them to a manufacturer, and then sold at $1.25 per pound, upon its merits. In this circular for October, 1868, they say: "Mohair, etc.—The present condition of this article offers a favorable opportunity for raising full-blood goats' wool," etc.—drawing a distinction between pure-bred and full-blood. These gentlemen are well-known as among the highest and most reliable authority upon this subject in the United States.

While I hold science and philosophy in the highest esteem, it must not be forgotten that they learn their best lessons in the school of practical experiment, and their true teachings can only be in conformity to established facts. As improvements and varieties in domestic stock have heretofore been produced by crossing, climate and subsistence, it will be unwise to reject the use of any of these means in

the future, unless all improvement is accomplished, all new uses supplied, and all new regions accommodated. But what need of speculation in the presence of substantial facts?

THE VARIOUS PRODUCTS OF THE ANGORA GOAT.

Their flesh is highly nutritious, and easy of digestion; is comely to the eye and pleasant to the palate, absorbing seasoning well. It is convenient in size, and the meat may be used fresh, or when cured. If fattened on corn, nothing is superior to it. Their milk is sweet and nutritious, being often prescribed by physicians for invalids and infants. As with other breeds of goats, cheese may be made of it of standard quality. The pelts of young animals, taken off when the wool is of a proper length, make most beautiful and comfortable furs for ladies and gentlemen, which *fashion* only would place as second to any others. Those of older animals, when dressed or tanned, make mats for doors, hearths, carriages, etc., of the most serviceable and beautiful description, and several sewed together make a robe for a buggy of the most comfortable and elegant character. A great many of the pelts were imported from abroad into New York, a few years since, by Messrs. C. G. Gunther & Co., at a cost ef $10 to $30 each, and they are still imported somewhat largely annually. The Angora goat is being very extensively raised in California, and a popular goat breeder's association has been established in Sacramento, and an extensive factory for the manufacture of their skins with and without the mohair on them, has been put in successful operation in San Jose, California, of which Mr. C. P. Bailey is president. Among many others, I have sold the pelt, with the mohair on it, of a yearling at $18. Their hides, in foreign countries, make the morocco leather, which all know to be one of the most pleasant and durable materials of its kind. Their tallow is white, clear and firm, bearing a close resemblance to sperm.

BUT THEIR CROWNINF VALUE IS THEIR WOOL OR MOHAIR.

At a meeting of the officers of the Kentucky State Agricultural Society, and many other gentlemen, samples of all the textile materials of that class were exhibited and examined, and discussed at length, and the Angora wool was conceded to be the most beautiful, durable and valuable material of them all. While it can be produced at a less cost, by us, than any of the others, it will also bring more money per pound, the full-blood wool not being scarcely distinguishable from the pure-bred and the imported. It is white, lustrous, wavy (not curly or in a screw), elastic and strong, with properties which enable it to resist decomposition (from any cause) better than any other textile material, receiving and retaining chemical and other dyes better than any other, and felting so kindly that this property is used in the manufacture of some of its most costly and beautiful products; and so much so that the breeders must shear promptly at the shedding season, or it will felt on the backs and sides of the animals, as every breeder has experienced.

A complete and extensive collection of small samples of all the principle wools of commerce, both plain and under several colors, arranged in a gilt frame, and under glass, together with several skins of goats, and of the "Improved Kentucky" sheep, with the wool on them, were exhibited by me at the National Exhibition at Philadelphia in 1876, and a medal and diploma were awarded them. They have since been deposited for exhibition in the State Agricultural room in the Capitol in Frankfort.

The American Institute at New York, and the United States Agricultural Society at Philadelphia, and the State Agricultural Society of Kentucky, adopted resolutions highly commendatory of these animals for wool bearing, and of their adaptation to the United States. The principal wool merchants of the eastern cities have made repeated

publications in encouragement of the production of mohair, and several of them now make quotations of it in their monthly reports. Besides the manufacture of it into fringes, laces, tassels, ornaments and hosiery, several extensive factories of it into dress goods, and into plush for the covering of chairs, sofas, etc., and especially into the covering of railroad car seats, have been established and are in successful operation in the United States. For this last named use mohair is especially adapted, and it will require all which can ever be produced.

Some of the mohair which I have produced has been satisfactorily sold on commission for me by Messrs. Bauendahl, of the city of New York. Several clips, raised by me here, and also my partner in a flock, Mr. J. W. Dunn, of Corpus Christi, Texas, has been satisfactorily sold by Messrs. Kitching Bros., of 82 Reade street, city of New York, who quote it regularly. Messrs. Justice, Bateman & Co., extensive and reliable wool merchants of Philadelphia, have recently issued a circular specially on this product, which every agricultural paper should publish. They say "mohair fleece can be raised in perfection in the United States," and they give excellent practical directions for its growth and management which every goat raiser should regard.

I have also shipped, by freight, several clips to the Farr Alpaca Company, of Holyoke, Mass., who have made to me positive reports of satisfactory sales, both graded and in bulk, giving me also the privilege of re-shipping it to be sold on commission if I preferred. I have also corresponded with Messrs. Hall & Turner, the proprietors of the Jamestown, New York, Alpaca Company, and I am assured that shipments may be made to them with like satisfaction. These two companies alone would manufacture at least a half million pounds of mohair annually, if they could get that of American growth and good quality.

It is scarcely possible that the supply will ever fully

equal the demand for the raw material in this country, where both sexes are so fond of fine appearance, and it is already rare to meet an elegantly dressed lady or gentleman without more or less of this material in their apparel, though it is, as yet, chiefly of foreign manufacture. Though France, Germany and Scotland all manufacture this product, England takes the lead, and it is said that she engrosses two-thirds of all the wool produced, and that she even does part of the spinning for the French manufactories of it.

PREPARATION OF THE WOOL FOR MARKET.

About the 1st of April, in Kentucky, when a somewhat fuzzy appearance in the fleece denotes that some of the goats begin to shed their wool, they should be well washed without the use of soap, in clear water (and the warmest accessible, though not artificially heated), and on a clear and sunny day. The males especially require washing, as they urinate on their fore legs in the breeding season. It may often be dispensed with after a heavy rain, and especially with the females and wethers. For this purpose, place a hog-scalding box, or other box or trough, near a clear pond or stream, and fill with water; submerge the goat to the neck in it, two men holding and rubbing. When the wool is cleaned of any dirt, and of the old skin which is being shed off, stand the goat upon a plank placed across the box, and press the wool with the hands, and let the water drain for a few minutes. After drying thoroughly for a day or two in a clean pasture, they may be shorn like sheep, if practicable, cutting off the wool about the ends of the hair, which is then growing out among the wool of grade goats. It is desirable to get as little as possible of the old skin and of the growing hair in the shorn fleece of wool. Each fleece should be carefully rolled up separately, outside out, and tied up securely and closely with small, fine, colored thread or twine. Pack the fleeces closely in a bag which

will contain one hundred and fifty to two hundred pounds, and it is ready for market. The female goats should be handled with great care, as, in this climate, they are then heavy with young.

THE MARKET VALUE OF MOHAIR.

The market value of mohair fluctuates considerably with fashion and taste for alpaca dress goods, which are made chiefly of this material, notwithstanding the name. The price also sympathizes with the price of fine lustrous wool.

HOW TO START A FLOCK, AND HOW TO PREPARE THE MOHAIR FOR MARKET.

(From the Courier-Journal.)

The recent publication in your widely-circulated paper of my article on the relative value of sheep and goats as wool-bearing animals has brought me very many letters of inquiry from all parts of the country in regard to Angora or Cashmere goats (to all of which I have replied), and I now wish to give my views as to the cheapest and most practical manner of producing a flock of wool-bearing animals, and how the wool or mohair can be best put in the market.

The great obstacle to prompt action in the matter is the first cost of a flock, and this obstacle has been greatly overcome by recent reduction in price to one hundred dollars per pair, instead of one hundred dollars each, the former price. The purchaser should then provide himself with about fifty select female common goats to be bred to the pure buck. These, in small numbers, are scattered all over the country, and once could be had near Memphis, Tenn., at fifty cents each, and can now be had in Texas and New Mexico at that price. The mohair, or fine wool, will be thus implanted in the kids of the first crop, but it is not of appreciable value, if shorn, as it will be but little longer than the native hair of the animals; though all hair, even

of cattle and hogs, is of some commercial value. The males of this first crop should be castrated when young, and they will make (prejudice removed) as acceptable food as hogs or sheep, and their hams, when salted and dried, can scarcely be distinguished from venison, for which they often pass.

The pelts of these animals, when grown, will defray all the expense of their raising, and there is steady market for them, many goats being raised in some countries for their pelts chiefly.

By the time the females of the first crop are two years old they should be bred to a pure Angora buck, which most probably will have been produced by the pure bred female, purchased at first, and this is the reason why it is best to buy such a female at first. The buck at first bought may be again bred to the flock of common females, after which it will be best to sell or exchange him. The mohair of the animals of the second crop will commonly be long enough to be shorn above the ends of the hair of the animals, and can be sold for more than enough to defray the expense of shearing, etc. The similar course should be pursued until five crosses have been made, when the animals are called full blood, the length of the mohair increasing with each successive cross, and the hair disappearing from their fleeces; though all of the animals, even the thoroughbred, will wear, for two or three months, suits of short, coarse hair, after their mohair has been shed or shorn annually in summer. By the time four or five or more crosses have been made, the animals can scarcely be distinguished from the pure bred, and metal tags in the ears of the pure breds should be used to distinguish them, though close inspection will often disclose some coarse hairs in the fleeces of full bloods. In this matter I do not write from speculation, but from matured experience, having in this manner, several years since, produced a valuable flock, from which, besides frequent small sales, I sold a small flock, chiefly of mixed bloods, for $2,000 cash, and I now have a flock of sixty

grown females, in which are a fair proportion of pure breeds, and all are several crosses over full blood. These I am about to breed to a very superior buck, either imported by Mr. Entichydes from Asia Minor, or is directly descended from his imported animals.

HOW TO PREPARE MOHAIR AND WHERE TO SELL IT.

As soon as the weather is warm in the spring, the goats will begin to shed their mohair, which may be known by fuzzy appearance over their bodies. No time should be lost, but as soon as this is perceptible they should be shorn like sheep, omitting the long, coarse hair of the beards and tails, as they are not of much value from small flocks, or, if shorn then, should be packed separately, as also the mane, which some goats have. The fleeces of yearling animals should also be kept separate, as these are the most valuable, and will be more easily graded if the clip is sold according to quality. For this reason, also, each fleece should be tied up separately *outside out*, with a small, strong, colored thread. All impurities of any sort should have been carefully taken from the fleeces before being shorn, but it is not generally necessary to wash the animals. In the breeding season the bucks urinate on their beards and on the wool of their fore-legs, which accounts for the disagreeable odor, and these animals may require washing. This operation may be easily performed in any pure water, without soap, and without heating the water. After being shorn, the animals may require housing during any very cold nights or cold rains.

After shearing, the mohair may be packed in bags of convenient size to be handled, and being carefully marked, may be safely shipped, by freight, to the East, where it will find a ready and remunerative market at any time of the year. I have thus experienced for many years, and more recently my mohair has been sold on commission by Kitching Bros., 82 Reade street, New York; at other times I

have sent it directly to the Farr Alpaca Company, of Holyoke, Mass., and have always had prompt and fair treatment. There are several other merchants and manufactories who deal in mohair, both in New York and Philadelphia, among the most extensive and reliable of whom are Messrs. Justice, Bateman & Co., of 122 Front street, Philadelphia, and I cannot do better, in this connection, than to quote a circular which they have recently published on this subject, as follows:

"Mohair fleece can be raised in perfection in the United States. We have seen samples from Virginia, Kentucky, and California equal to any grown abroad. At the same time, we must candidly say no native clip approaches, even in skillful culture, the product usually found in the Liverpool market. Those who wish to furnish the combing trade, which buys the best material, are advised to follow the directions below: Exclude from your flock all animals of less than seven-eighths pure blood. Keep the animals young, by killing after taking off the third fleece. The length and lustre of the fleece may be increased by crossing with the Van goat. Select bucks for breeding, whose locks maintain their full size to the end of the staple, that is, such as are not spiral. The value of fleece is computed from its length, lustre, quality (fineness of fibre), and strength. Keep your flock out of burry pastures. Burs frequently cause a loss of ten cents a pound on the product. Clip but once a year, as early as practicable; after the fleece begins to shed it loses in value very rapidly. Pack the beard, belly, and tail wool separately, also the coarse locks, brown ends, and shorts, and send the clear fleece alone to the comber."

These directions are, of course, indended to apply to established flocks, the mohair product being chiefly the object. As I am not familiar with the Van goat, I suppose it is some variety or family of the Angora, which has not yet

been introduced into this country from Asia Minor, but which I will be glad to obtain.

Allow me, in conclusion, to say a word in vindication of the goat, too much abused and shunned on account of his breachy habits. These are to be attributed almost entirely to his keeping the bad company of careless farmers, who keep bad fences, under which he learns bad habits when young. I usually keep them in two or three separate flocks, under fences of all kinds (except my hedges of Osage orange, which they would eat up), and they are kept as securely as any other stock, the stone fences being easily fixed to retain them; and all other stock will sometimes break a fence, but a goat never will.

THE VAN ANGORA OR CASHMERE GOATS.

Editor Yeoman:

The readers of your valuable paper may remember that, in my article on Angora goats, which you published, allusion was made to the circular of Messrs. Justice, Bateman & Co., of Philadelphia, in which they recommended the crossing of the Angora goats of the United States with the Van goat of Asia Minor; and in which they gave, also, valuable directions for the production and preparation of mohair, or goat's wool.

Desiring to avail myself of every valuable improvement in breeding these animals, I have instituted inquiries for the Van goat, and I have a recent letter from Col. Keene Richards, of Georgetown, Ky., in which he informed me that, during his extensive travels in Asia Minor, when he was selecting and shipping his fast horses, he saw large flocks of the Van goat on the borders of Lake Van, between Kars and Mosul. Also that he has a fine oil painting of a good specimen of one drawn by Mr. E. Troy some years since.

If further developments conduce to show these animals

as superior to all others of their race, I will hope to obtain one for crossing on my flock next season. At present I am breeding a flock of sixty choice females to the superior buck, Ulysses II., of Eutychides' importation.

The great decline in the price of sheep's wool since the war has not only given to the public taste a strong direction to such breeds as are best for the production of wool and mutton combined, but also to the breeding of wool-bearing goats; and it has been uniformly demonstrated that the same feed which will subsist three sheep will also subsist five goats of the wool-bearing kind; and the fleeces of these five goats will produce about double the value of the wool of the three sheep, while they will also produce more meat of equal if not better quality; and so, also, of their hides, and their tallow, and their skins with the mohair on them.

Although the times are so hard and so repressive of everthing new and enterprising, yet I have very many more inquiries for goats than ever before; also several propositions to breed them on the shares, and I am making some valuable sales to various parts of the country.

Respectfully, etc.,

ROBERT W. SCOTT.

December, 1878.

GOATS IN TENNESSEE.

GRASSY COVE, TENN., June 23, 1877.

J. B. KILLEBREW, Esq.

Dear Sir—Yours of the 2d inst. is at hand. I wrote an article for *The South* in March, which I enclose. I do not know as I can write anything much different and do justice to the subject. Every month's experience more fully convinces me that the raising of the Angora goats in the Cumberland Mountains can be made a great success. A flock of from 200 to 500 are absolutely less trouble than ten or a dozen, as they constitute a community of themselves, and

do not seek the barn and other stock for association, and consequently are less liable to get in mischief.

Yours truly, LORENZO STRATTON.

[From The South.]

Your letter is at hand, asking for any information, derived from personal experience, on the subject of Angora goat raising on the table-lands of East Tennessee.

Although it is a little out of my line to write for publication, I can, after my style, give you a short history of the facts. Two years ago last April I purchased seventy goats; eight of them, four ewes and four bucks, were supposed to be full-blood Angoras; thirty were grades or half-bloods; the balance were the common scrub goat of the country. The winter previous to my purchase the goats had been confined in a small enclosure, improperly fed, and without opportunity to help themselves. They were consequently in a bad condition; several of the old ones had died; between fifty and sixty kids had been lost in February and March, and it was with some difficulty that I succeeded in getting my purchase home alive. But I had a pasture ready for them that has proved to be well suited to their wants; it was a mile and a half long by a quarter of a mile wide; that is to say, the pasture reached from the bottom lands a quarter of a mile up the mountain, and then extended one mile and a half parallel with the mountain and bottom lands; it is something over a mile to the top of the mountain, and my pasture hardly extends a fourth of the way up. This side hill is a rich limestone soil, but excessively rocky and rough, with ledges and cliffs extending down near the middle of the pasture, more than half way across it. A flock of Spanish sheep had run in this pasture for several years; but the bushes and briers were gaining on the sheep, and the acres of clover were growing less and less every year. Into this pasture I turned the goats on the 9th day of April. Leaves on the briers and bushes

were not yet full size, but sufficiently grown to give the surroundings the green and attractive appearance peculiar to spring.

The way the goats went for the briers and bushes demonstrated at once that the right kind of stock was in the right place. They soon found the cliff of rocks, where there was a good shelter from storms and a nice shade from the summer sun, and at this place they have made their home, or headquarters, ever since; and they were so well suited with the place that it was six or eight months before they found out that they were surrounded by a fence, for they had not yet made a track within fifty rods of either end of the pasture, having paid their respects exclusively to the briars and bushes in their immediate vicinity. But in the second year, when the briers and bushes failed them in the pasture, they found their way through the fence on the back side, and still continue to run on the side-hill above the lot, but always come down to the cliffs in the pasture at night. I have found these strongly marked differences between sheep and goats:

First. Goats will not feed on clover or other tame grasses when they have free access to briers and bushes. Goats kept on tame grass and clover pastures, and treated in winter as Vermonters treat their sheep, do not make a success. The goat is a browsing animal, and delights in a warm climate and high land.

Second. Sheep, with good clover and other tame grasses, will not disturb bushes or briers; yet it is quite true that, in the absence of tame grasses, sheep will exist on briers, bushes, etc.

Such being the facts, goats have the preference in the Cumberland mountains, for the reason that the tame grasses are here in very limited quantities, while the favorite feed for the goats is practically without limit, and does not cost a penny. The first winter I commenced to feed my goats about Christmas, and to the seventy I fed a four-quart

measure of corn every evening until sometime in March. The corn was worth 50 or 60 cents per bushel. Say as much more for the trouble of feeding them, and you can readily estimate the cost of wintering seventy goats. The next winter I did not feed them until the 20th of March. At this time we had a snow of eight or ten inches that lasted three days. I brought the goats to the barn and fed them all the hay they would eat during the snow.

This winter snow fell on the eve of the 1st of January a foot deep, and laid on a week or ten days; and on New Year's day we brought the goats to the barn and fed them with hay until bare ground appeared, when the goats marched off for the mountain, where they have remained since, amusing themselves by nipping, browsing and picking acorns.

If the bucks are allowed to run with the flock, there would be two crops of kids per year. One crop coming in the fall or winter, would require extra care, or many kids would be lost. I therefore decided to put the bucks in a different lot and keep them separate until the 20th of November. The result was, that the first kid I saw was on the 21st of April, and within a week I could count between fifty and sixty, and there were only forty ewes in the flock, the balance being mostly wethers.

Last spring my flock was increased by seventy-five kids; and as I use only the full-blood Angora bucks, the grade and quality is improving rapidly, although not of the first quality of wool; yet I shall have an hundred goats to shear this spring, and another crop of kids. The wool or mohair, being mostly from grade goats and not fine enough for top prices in the market, we have had it worked up on shares for domestic use.

Within the three years between thirty and forty of the wethers have found their way to our table; half as many more have been sold to our neighbors, principally for state occasions, for the flesh of the Angora or grades is consid-

ered a great delicacy. The skins have been sent to the tanner; so we are eating their flesh, dressing in their fleece, and being shod in morocco, with the prospect of gay carpets and kid gloves in the near future—not French kid, or rat skin, but genuine Tennessee kid.

The Cumberland Mountains, or Table-lands, are something over one hundred miles long, and have an average width of forty miles, interspersed here and there with small valleys and coves of great fertility. Such lands, with some improvements, are worth from eight to ten dollars per acre; but the mountain proper can be bought at from fifty cents to one dollar and a half per acre. It has an elevation sufficient to temper the heat of summer, and then it is far enough south to give us short and mild winters, and is proverbially one of the healthiest countries in the United States. I have sometimes thought that if some of the people about New York, and perhaps in other places, that are complaining of hard times, and find it difficult to meet city expenses, were here, with a flock of goats, they might be well fed, well dressed, and well shod, for goat meat can be raised inside of *one cent* a pound, to say nothing of their fleece and skins, both of which can be worked upon shares. Then, you see, they might dismiss the currency question, and let monopolists and bank panics go to the dogs.

LETTER OF MR. JOSEPH PHILIPS.

Mr. Joseph Philips, of Davidson county has been very successful in raising Angoras, and he has kindly consented to give the State the benefit of his experience in goat raising. But it is better that he should speak for himself, which he does as follows:

Though the Angora goat is the last contribution of the animal kingdom to the manufacturing and art industries of the world, it nevertheless has occupied a place in the primitive industries and necessities of the nomadic tribes of Cen-

tral Asia prior to the advent of our Savior on earth, and at a remote period anterior to its introduction to its present recognized home in Angora, Asia Minor.

There is an entire absence of any reference to this animal as characterized by its long, silken and attractive fleece, by any of the earliest classic writers of antiquity, or in that oldest of historic monuments, the Bible. The goat is frequently mentioned, but no allusion is made to its fleece, hence we may infer the long fleece-bearing goat was introduced subsequently to Asia Minor during some incursion of predatory tribes from Central Asia, where we have abundant proof of its existence in the exportation of mohair from Chinese ports before the exportation of the raw material was permitted from Angora.

The earliest notice we have of the Angora goat is in the sixteenth century, and though since known to naturalists as possessing a valuable fleece for the manufacture of useful and rare textile fabrics, its acclimation in Europe has been but feebly tested, and in fact its success in any other clime than Angora seems to have been deferred to the enterprise, energy and intelligence of Americans, who, with characteristic zeal, have imported them in considerable numbers, and are now reproducing them with fleeces fully up in fineness, and even better, than the clip from imported parents.

Owing to prohibitory restrictions preventing the exportation of these animals until recent years from Angora, coupled with the high cost of transatlantic transportation, the possession of Angoras has been a privilege enjoyed only by a few, and consequently regarded by the masses as an exceptional luxury without practical utility or profit.

The first Angoras imported to the United States, owing to fraudulent representations as to the value of the mohair, sold for fabulous sums. Buyers of this importation failing to obtain a market for the mohair, the interest sickened and was finally lost sight of in the more engrossing events of the late civil war.

Until a few years since the recollection of the first transfers of Angoras had operated adversely to the development of the interest, and the enterprise was stifled under the conviction that there was no demand or market for mohair. Even at the present time, among an intelligent class of wool growers in the United States, there is an entire ignorance of the existence of mills in New York and other States for the conversion of mohair, besides both a domestic and foreign demand largely in excess of the annual clip of our country.

The mohair of commerce, strictly the product of the Angora goat, has its individual place in the textile fabrics. Though often combined with cotton, wool and silk, it differs mainly from wool in the absence of any felting property, and on account of its lustre, elasticity, strength and durability, is admirably suited for furniture plushes, and being nearly indestructible, is used by nearly all of the railroads. It is also used in the manufacture of the finest ladies' and men's wear, where brilliancy and last are desired. The commercial value of mohair depends on condition, length, lustre and fineness, and varies from fifty cents to one dollar per pound.

The Angora crosses readily with the native American goat, the fifth cross producing the full blood, which is identical in appearance with the pure goat, as well as producing a fleece worth the same as mohair from the pure animal. Some authorities contend, in crossing the Angora on the American or native goat, that the native strain can never be eliminated, and will re-appear, notwithstanding the hybrid by each successive cross is constantly approaching, but will never attain the type of perfection of the pure Angora. These same authorities forget that the natives of Angora frequently repair losses in their flocks by crossing the white Angora, with its silken ringlets, on the black Hurd goat, which, after the third or fourth cross, establishes the type of the white Angora. This process of crossing in its mother

country explains the presence of brown or yellow tinted coarse hair that succeeds the annual shedding of the mohair, which is in turn shed, and displaced by the mohair on some imported animals.

The facility with which the Angora crosses on the native American goat, and the aptitude they possess in acclimation, coupled with the boundless territory in the United States suited directly and only to the subsistence of goats, all combined, give an augury of an industry limited only by the boundaries of our national possessions, and second to no other agricultural interest in revenue and profit.

The goat is both graminivorous and herbivorous, but when left to a choice of food, will subsist entirely on bushes, briers and weeds, and on that class of vegetation that serves as an impediment to grass, and is rejected by all other stock, and will earn his keeping in the service rendered as a vegetable scavenger in ridding any farm of briers and bushes.

By a comparative analysis of the profits arising from sheep husbandry and Angora breeding, though I would not disparage the sheep interest by advocating a reduction of flocks or numbers, still the Angora interest is susceptible of indefinite extension without, in any way, molesting the production of wool and mutton. Sheep husbandry, *per se*, implies perennial grass and high priced lands, while Angora breeding signifies just the reverse—thrives best on lands devoid of grass—rocky, brush hill tops, abandoned gully-washed fields. The Cumberland mountains, with an altitude above the fogs and heavy dews, covered with bushes and briers for food, and its cliffs and protecting rocks as coverts and safe retreats against rain, snow and wintry winds, will, at no distant day, be appropriated as the ranch of white, silken fleeced Angoras. The amount of capital required in starting a flock of 2,000 native ewes with full blood Angora bucks, would be small in comparison with an enterprise of the same magnitude with sheep. Two herders, with four shepherd dogs, would be ample force to manage this num-

ber of goats. As the wild natural subsistence is consumed in one locality the range could be changed. Temporary shelters facing southward and enclosed on the north and west sides as wind screens, would furnish protection from rain and snow. By keeping rock salt in the vicinity of these shelters, the goats would return at night from the range without the assistance of herders.

With an experience covering twenty years in breeding Angoras, they have proven universally healthy and free from the diseases and contagions that so often decimate flocks of sheep. There is but one ailment to which they are subject, and that, an inflammation of the hoof, resulting from running on grass sod; this would not occur, or, if so, only to a limited extent on rocky, dry ground, free from grass. The application of pulverized bluestone in the cleft of the hoof, and coal tar afterwards, is a prompt and certain remedy. This inflammation lames but seldom ever proves fatal, and never when treated in due time.

The Angora goat probably more than any other domestic animal demands freedom and perfect ventilation, and succumbs to close confinement in imperfectly ventilated quarters. For this reason he is enabled to endure the inclemency of winter far better, and will obtain subsistence under circumstances fatal to sheep.

By nature this goat is organized for high, dry, rocky altitudes; can subsist for a much longer time without water than sheep, and this attribute, with his capacity to subsist on scant vegetation, suits him for vast areas in the extreme West subject to annual visitations of drouth, and unsuited to any other industry. There are many portions of Western Texas, Arizona, Colorado, New and Old Mexico, whose topography, climate, temperature and hygrometric conditions are the same as the home of the Angora in Asia Minor, and where the native Mexican goat can be had by thousands at fifty cents a head as a basis for crossing with Angora bucks. The mountains of Tennessee, North Carolina and North

Alabama, as well as the pine woods of Georgia, Alabama, Mississippi and Louisiana, are well suited to breeding Angoras, the pine woods particularly exempting the young kids from danger of extreme cold, which frequently proves fatal in more northern latitudes.

The period of gestation with the Angora goat is from one hundred and forty-five to one hundred and fifty days, and as they produce but once annually, the period of pregnancy should be so arranged as to terminate in early spring, after all danger from cold winds and rains has passed, which in this State is about April 1st. In States south of Tennessee October 1st, and in Tennessee November 1st, is the proper time to couple the ewes with bucks. Until young kids have suckled they are sensitive to cold, but having once nursed their vitality is probably greater than the young of any other domestic animal. When three weeks old all male kids not needed for sale or for use in the flock should be castrated, as the kids are easily taken at this age on the range, and the wound is rapidly cicatrized. The wethers, if kept until two years old, become fat and command the same price as sheep of the same age.

The flesh of a two year old wether in juiciness, texture and delicacy of flavor, is superior to the finest Southdown mutton, partaking of the flavor both of mutton and venison, and often sold as the former from the butchers' stalls. The Angora clips from two to six pounds of mohair, and is finest when the animal is one year old, maintaining quite a uniform standard of fineness until four years of age, when the quality begins to deteriorate, and becomes coarse at eight years old. Its age is from eight to twelve years, and death is generally the result of superannuation.

The claims of this animal on the attention of agriculturists and stock breeders have been held in abeyance through prejudice, and a want of a proper conception of the uses for which nature designed it. Independent of the value of the animal for its fleece and flesh, it possesses a mechanical

value in its daily search for food which is the representative of so much manual labor economized in the complete destruction of briers and bushes. The Angora goat is the only agent outside of hired labor that will serve this purpose, and his insatiate appetite for buds and leaves is the motive power to his energy, that never tires so long as a bush or brier is in sight.

Col. B. F. Cockrill informs me that he annually expended three hundred dollars in cutting blackberry bushes from his grass lots until he obtained a flock of Angoras, which have entirely cleaned his farm of briers; his experience is only a repetition of my own.

JOSEPH PHILIPS.

Nashville, Tenn., Sept. 2, 1879.

MANUFACTURE OF GOAT FLEECE.

(Agricultural Report of 1867.)

Mr. Israel S. Diehl, formerly United States Consul at Batavia, Java, was deputed to visit Europe the past year to investigate the manufacture of Angora or Cashmere fleeces, with reference to its introduction into the United States.

The acclimation of these goats in this country is an established fact. For several years, in different parts of the Union, the Angora goat has been bred, both pure and crossed with our native goat. Far from deteriorating by the transfer, as had been predicted, it is found that in some parts of the country even the unmixed breed of the imported goats has shown evident signs of improvement resulting from the change. This branch of pastoral industry has begun to assume very considerable prominence, as is indicated by the fact that during the past year not less than $100,000 have been paid for these goats in Ohio alone.

In order to test the quality of the fleeces produced in this country, Mr. Diehl, prior to his departure for Europe, collected specimens from the different flocks and localities, from

Massachusetts to California, and subsequently compared them with foreign fleeces at the Paris Exposition and elsewhere, both in Europe and Asia. His own deliberate opinion is that in fineness, delicacy, and beauty, the American fleeces were equal, if not superior, to the choicest Oriental specimens met with. On the subsequent exhibition of these samples at Paris and Roubaix, in France, and in London and Bradford, in England, the manufacturers expressed the most delighted surprise at their beauty and facility of manipulation, pronouncing them fully equal to the best imported Asiatic fleeces.

It is stated that most of last year's clip was sold on commission by a single New York house. Three manufactories have provided machinery for its experimental manufacture. These parties ventured to pay for fleeces, varying from three-fourths to pure breed, from fifty cents to one dollar and fifty cents per pound. The goats shear from two to eight pounds each, according to blood, age, and sire, hence it is far more profitable, even at these experimental prices, to raise goat's fleece than sheep wool. The establishment and extension of this manufacture cannot fail to stimulate its increase and secure its permanancy. For combed and washed fleece, suited to faucy work, much higher prices have already been realized. Skins of yearling wethers, from seven-eighths to fifteen-sixteenths pure breed, have been sold at eighteen dollars apiece.

Having ascertained our manufacturing deficiencies, Mr. Diehl next visited the Paris Exposition, where he directed his attention to the fabrics of various kinds of goat's fleece. He was astonished and delighted at the extent, rarity, delicacy and exquisite beauty of the specimens contributed by the looms of Asia Minor, India, France, England, Germany, and other countries represented in this department of the Exposition. These manufactures consisted of shawls, camlets, challis, mohairs, poplins, velvets, delaines, hosiery, yarns, gowns, robes, rugs, fur-trimmings, tapels, etc. Some

of them were made of pure goat's fleece, and others of the fleece mixed with wool, cotton, silks, and other fibres, imparting to these compounds a luster, strength, and durability which no other fibre except silk will secure. Nearly every nation represented at the Exposition presented some beautiful manufactures of goat's fleece. India, England, France, and Austria, seemed to excel in the more delicate fabrics, while Turkey exhibited the greatest variety and richness of the raw material.

In England the manipulation of this staple is practically monopolized by a few parties, who appear adverse to imparting any information in regard to the manufacture and sale of their fabrics.

The fleece manufactured in England is mainly produced in Asia Minor from the Angora goat. It is imported to the extent of 3,000,000 pounds per annum, and is known in commerce by the name of mohair.

Messrs. Hughes & Ronald, wool brokers of Liverpool, in a recent report, thus speak of this Angora fleece:

"The importation of mohair is of comparatively recent date. It is scarcely a quarter of a century since it was introduced into this country. It was for some time chiefly used for the list ends of wollen cloths, and commanded but little attention, but for some years past it has been greatly gaining in favor for the fancy trade, and has now become an article of considerable importance, our annual import being 3,000,000 pounds weight. It is particularly adapted for damasks, velvet for coach-linings and curtains, and ladies' dresses, mixed with cotton and silk, and produces a most agreeable texture. A large quantity of the yarn spun in this country is exported to France and Germany, where it is chiefly manufactured into velvet. The fashion has this year run very much upon mohair for ladies' dresses, and every thing on the spot has been bought up for home consumption."

The supply of Angora fleece in Asia Minor is limited and precarious; access to it is both difficult and dangerous from the jealousy of the government and the barbarous bigotry of the people; hence, English and continental manufacturers are looking to the Cape of Good Hope, Australia, the United States, and South America for an increased production of this staple to meet their necessities. The value of this entire interest would be enormously enhanced by the opening of an adequate and permanent source of supply.

In Europe the fleece is spun into yarn, mostly in England, or at Boubaix, in France, thence distributed over Europe for manufacture into cloth. The excellence of the yarn spun in England and Boubaix is due partly to superior skill, partly to peculiar and improved machinery, and partly to natural and artificial humidity of the atmosphere.

From very transparent motives the process of spinning has been represented by those in the interest of the monopoly as very expensive and difficult, nay, even a profound secret, known only to those now engaged in the business; but these representations were flatly contradicted by the exhibitions at Paris of a great variety of machinery for carding, scrubbing, spinning, and weaving the tiptik or Angora fleece. This machinery, purporting to have been made largely in Bradford and Roubaix, two great seats of yarn production, entirely exploded the assumption.

The delicate processes of modern machinery surpass even the quaint and exquisite skill of oriental operatives, while in accuracy of design and cheapness of execution there is a still greater difference. This enables the European manufacturer to purchase the raw material of Asia Minor, to pay export and import duties, and then undersell the Asiatic fabric, forstalling its entire western market.

Mr. Diehl visited Angora, and examined the looms and processes of manufacture in use among the natives. These he found to be exceedingly crude and simple. The fleece

is first taken to a running stream, where it is washed by hand and trampled under foot in the water. It is then spread upon the sand to dry and bleach, after which it is assorted according to fineness, length, and purity. It is then hackled on a simple, old-fashioned hackle, consisting of a few dozen long iron nails driven through a board. After hackling, the fleece is placed in bundles or rolls and spun into yarn, mostly by the women and children. For this purpose a common distaff is used, or a stick from twelve to eighteen inches in length, with cross pieces, rendering it about equivalent to a large spool. It is then ready for the loom. This instrument in Angora is of the simplest and rudest construction, and of the same unvarying type that has been used by countless generations. Asiatic industry is frugal in labor-saving processes. When once machinery is brought to such a degree of efficieney as to render it barely possible for an unlimited amount of labor to supplement and supply its deficiencies, no further improvement is made. Men then subject themselves, their minds, and muscles to a training which makes them almost a part of the machines they operate. Caucasian mind seeks to emancipate itself from all unnecessary labor by transferring it to machinery, thus leaving the mental faculty free for intellectual labor. Each of its tasks it devolves successfully upon inanimate matter, while it continually ascends to higher results. But this function of intelligence seems to be entirely ignored by Asiatic mind and Asiatic art.

The manufacture of Cashmere, camels' hair, and other shawls, once so flourishing in Asia, is greatly impaired, and in many places entirely discontinued. But few of the once famous Cashmere shawls have been manufactured since the rise of the fatal competition of Lyons, Paris, Paisley, Vienna, and other manufacturing centers of Europe. Caucasian capital and skill, aided by the elaborate contrivances of machinery, can now produce at much lower prices fabrics

as delicate and beautiful as the famous Cashmere shawls, though, doubtless, not so durable.

The immediate introduction of this shawl-weaving into the United States is, perhaps, impracticable, though its final success here is but a question of time. The obstacles to be overcome are lack of skilled labor, of machinery, and of an active home demand for fabrics of goats' fleece.*

---

* Since the above articte was written, ten years ago, a demand has sprung up, and will continue to increase. The present fashion of ladies' dresses requires a description of so-called clinging fabrics, for the manufacture of which the Angora fleece is peculiarly adapted, and we are informed that a number of factories have already been established in the eastern States for that purpose, and some of our intelligent farmers are availing themselves of the opportunity to diversify their industries by raising these goats, as will be seen from several letters from them, which we publish in connection with this subject.

APPENDIX.

APPENDIX.

LETTERS FROM PROMINENT SHEEP RAISERS.

FROM TOM CRUTCHFIELD, ESQ., HAMILTON COUNTY.

J. B. KILLEBREW, *Commissioner of Agriculture, etc.*

Dear Sir—You ask me, for the use of your bureau, my experience in sheep husbandry, and such suggestions as I may see proper to make. I would much prefer some one more competent and of greater experience than I, had been called upon.

My first practical experience with sheep commenced in 1864, since when and up to the present time I have given it more than ordinary attention, having found it not only a great pleasure in conjunction with other duties of the farm, but also one of greater profit in proportion to the capital invested, than anything else pertaining to the farm.

I had been accustomed to the native sheep of Tennessee, had never seen any of the improved breeds, and well remember my astonishment when I first saw the massive Cotswolds at Laurel Hill, the beautiful home of James P. Johnson, of Williamson county, from whom I made my first purchase of Cotswolds.

In 1864 I purchased a lot of native ewes, and was fortunate in getting the use of a superior Spanish Merino ram, bred by R. Peters, of Atlanta, Georgia, to cross upon them, which cross gave great improvement in carcass, form and fleece, covering the naked places of the natives, and making the fleece much more dense and the fibre finer and stronger.

I saved the ewe lambs of this cross, and bred them to an improved Kentucky buck, bred by Robert W. Scott, of Frankfort, Ky., which increased the size of carcass and gave greater length and yield of wool.

The ewe lambs of his get were bred to the Cotswold buck bought from James P. Johnson, and I have continued to breed to the best Cotswold buck I could procure, American breed and imported, never using one buck longer than two years, and *never* breeding in-and-in. In the meantime I have added to my flock American bred and imported Cotswold ewes at heavy cost, breeding them to the same bucks.

The imported and American bred Cotswolds and their offspring are not superior either in carcass or fleece to those of my own breeding. I clipped samples of wool from Prince of Wales, an imported English bred buck, and also from a ewe of my own breeding which, through several generations, could be traced back through the Merino cross to the native. I sent these samples to my wool merchants in Boston, Mass., with history of the wool, and requested their opinion of the wool on its merits. They pronounced the ewe's wool superior to the buck's! It was equally as good combing, about eighteen inches long, was of finer and stronger fibre, soft to the touch, attributable to the shade of Merino in it.

The effects of the cross to the Spanish Merino in fineness and softness of fibre and density of fleece and strength of staple remain for many generations. I cull my ewes annually at shearing time, marking all that are deficient in form or fleece, or that are becoming aged, and set them apart with the wethers for mutton, which are sold the following spring, after taking from them their fleece, they commanding a better price than ordinary sheep, because they gross less and are better mutton.

I sold a lot last spring (fatted principally on grass) to the butchers of Chattanooga, that averaged 166⅔ lbs. gross, having clipped an average of 10⅔ lbs. of nice combing wool, which sold at 37½ cents per lb. The price received for them was 6 cents per lb. gross, netting me $14 per head, while the market for ordinary mutton was 4 cents. They grossed less than one-third, and were sold for 15 cents per lb. net, and, like Oliver Twist, "the cry was for more." (And here, by way of parenthesis, allow me to say that all improved stock, hogs, cattle, etc., will give like results over the scrub.)

I never breed in-and-in, its effects tell more rapidly and surely upon sheep than upon any other stock.

The buck is allowed to go to the ewes about the middle of August, and is taken from them in November or December. The buck should not be allowed to run with the ewes after they are impregnated or while they are lambing, as there is danger of miscarriage by his injuring them. If a ewe miscarries or loses a lamb after mature birth, she will usually let the buck serve her again in a week or two after such loss, and sometimes when the ewe is nursing she will be served by the buck, which causes lambs to be dropped at unseasonable times, keeping the ewe in poor condition and difficult to keep through the winter, with a delicate lamb and loss of lamb from her the next spring.

The ewe lambs should not be bred until a year old past. It checks their growth and weakens their constitution.

In Tennessee we have a wonderful diversity of soil, climate, locality and pasturage. In East Tennessee we have the hills and mountains, an almost inexhaustible summer range, with locality elevated and dry, with never-failing streams of pure water, also the productive valleys, river and creek bottoms, with their rich meadows. In Middle Tennessee we have

the blue-grass region, equal to Kentucky, furnishing good grazing almost the year round. The breed of sheep that would be suited to one locality might not be suited to another In selecting a breed for any locality we should take into consideration feed, climate and surrounding circumstances, with market facilities and demand for the mutton or wool, or both. We should then use that breed which will give the greatest net value of marketable products.

In Middle Tennessee, especially the blue-grass region, the large imported English breeds, giving heavy carcass and great yield of wool, can be more successfully and profitably bred and reared than in any other portion of the State, unless in special localities where they can be given rich pasturage similar to that furnished by the blue-grass of Middle Tennessee.

No one breed of sheep combines all the good qualities, hence the many crosses that have been made, not only with all the imported English breeds, but also at home with our own natives. I believe it is a matter of experience with sheep breeders that the most profitable sheep are those of cross-breed races.

By the breeder breeding for a specific purpose, as Bakewell, of the Dishly farm, did in producing the improved Leicester; as Robt. W. Scott, of Frankfort, Ky., did in producing the improved Kentucky; as has been done in breeding to produce the Oxfordshire, Hampshire and Shropshire Downs—all, even the Cotswolds, have been refined by the mixtures of other blood. Originally they were bred only on the headwaters of the rivers Severn and Thames, and were a very large, coarse sheep They have been extensively crossed with the Leicester or Bakewell, diminishing their size and fleece, but improving their carcass and rendering it earlier of maturity, giving to their fleece the lustre that it did not originally possess, and at the same time detracting from its density.

The improved breeds from the States are being shipped to Colorado, California, New Mexico, etc., to cross upon the natives there. So we of Tennessee, with our great diversity of soil, climate, etc., by judicious crosses upon our natives, can furnish a counterpart, at little cost, for every race of sheep valuable for its fleece or mutton, if we give our time and attention to such as may be suited to each locality.

Probably nine-tenths of the sheep of Tennessee are natives—scrubs—yielding about two pounds of wool, and of mutton, gross, about sixty pounds. These, of themselves, are of but very little benefit to the owner or to the revenue of the State; but as a basis upon which to build, by using improved males, they can be made, with very little cost, a great source of revenue to the owner and to the State.

In my judgment, by using the native ewes of fair size, good shape and robust constitution as a base, and crossing upon them the Spanish Merino buck, saving the ewe lambs of such cross and breeding them to the Cotswold buck, we can produce a breed of sheep healthier and better suited

to our climate, soil and pasturage than any of the improved breeds, yielding as much mutton in carcass, and as great a quantity of wool. A cross of Merino and Cotswold would result similarly, but would not utilize the great number of natives. A cross direct of the Cotswold and natives is a vast improvement, getting rapidly to the large carcass and great yield of wool; but without the Merino cross, the density of fleece, fineness and softness of fibre imparted by it cannot be attained.

It is of the utmost importance that those breeding either of full bloods or crosses should select the best of rams. A good Merino ram bred to the native ewe adds one hundred per cent. to the yield of wool, and greatly to the carcass in symmetry of form and fattening qualities. Nor is this all: the half-bloods are worth double their dams, and can be used as a basis of still higher and greater improvement by the use of the large carcass, long-wooled rams, which cross will greatly increase the weight of carcass and double the yield of wool. When the number of lambs produced by one ram is taken into consideration, and when it is seen over what an immense extent, even in his own direct offspring, his good or bad qualities are to be perpetuated, how obvious, then, that none but the best bucks should be selected! How important, then, that every scrub ram in the State should be exterminated, and his place supplied with one of the improved breeds.

In a few years the natives would become extinct, and in their stead we should have a breed of sheep yielding from twice to four times the quantity of wool, and of a superior quality, aside from the great increase of mutton in carcass.

Some may say that the expense of procuring an improved buck is greater than they can bear. If they are able to own a flock of sheep, they are able to own an improved buck. It would be money saved to give half an ordinary flock of natives for an improved buck. The increase of wool alone (not taking into consideration the increased value of the lambs of the first year's get by an improved buck) would pay for him, and every clip after that, with the increase of lambs, is that much gained.

The Commissioner of Agriculture for the State of Georgia reports the annual profit on capital invested in sheep at sixty-three per cent. Tennessee ought to do equally as well—in fact, better, for in Georgia the improved breeds will not succeed as well as in Tennessee.

DISEASES.

With proper change of pasturage and keeping the sheep away from low, moist ground, they are comparatively free from disease.

If sheep are kept up, it is better to have their pastures divided into two or more lots, and let them occupy one portion two or three weeks, and then change to another. The change is of great importance to secure health and necessary variety of food. There are certain pungent plants and weeds which sheep are very fond of, and which seem necessary to

their health, for which they will leave the best of grasses to feed upon, which become exhausted in permanent pastures.

Salt and shade should be constantly accessible. During the summer months they feed early in the morning and late in the evening, and, during moonlight nights, late into the night. They resort to the same sheltering places of shade and rest day after day, which become very foul and injurious, unless kept covered with litter or cleared off.

In the months of June and July they are very much annoyed by the gad-fly depositing its egg in the nostril of the sheep. The discharge from the nostril caused by the larva of the fly is frequently called "the rots." Though very annoying to the sheep, it is not a disease. The grub is found in the heads of most all sheep. A similar grub is found in the head of the deer, deposited by the buck-fly. By a copious and oft-repeated application of tar to the nose of the sheep, during the months of June and July, the fly is less troublesome, being repelled by the tar.

I have lost a few sheep by "staggers," "turnsick," etc., properly hydatid on the brain, by allowing the sheep to range upon low, wet, spongy lands. By removing them at once the disease ceased.

By changing from dry food or short pasturage to rich, succulent pasturage, and especially to rank clover pasture, I have had my sheep to scour badly. I have never failed to control it by removing to a shorter pasture, or feed a few days upon dry food, hay, oats, etc.

They should not be sheared in spring until all danger of cold has passed. After the loss of their fleece they are very liable to take cold, which results in a cough and discharge from the nostril, and frequently in the loss of the sheep.

They should *never* be sheared in the fall. They need their warm coat, as well as man, to protect them through the winter. They should have open shelters, accessible at all times, to protect them from severe storms.

I have never seen a case of foot-rot, which is a disease of the foot. I have frequently had my sheep to get quite lame in their fore feet, but upon examination found that the lameness was caused by breaking of the hoof, and not unfrequently a small chip or stick would get into the cleft of the hoof, which, by constant irritation, would make a sore and create lameness. Sometimes, after rains, the mud which would be forced into the cleft while soft, would harden, and by chafing, produce lameness; by simply removing the cause, the lameness would soon be gone. If, at shearing time, a little pains be taken to trim the foot, much of this would be avoided.

When the bucks and ewes are placed together for the purpose of breeding, the *tail and the buttocks* of the ewes, and *the wool from the belly* of the buck, should be cleanly trimmed. A neglect of this, especially with the long-wooled breeds, frequently results in loss of impregnation of the ewe, and a weakening of the buck by a discharge in the clotted wool of the belly of the buck or buttock of the ewe.

The lambs should be docked (tails cut off) when a few days old. It improves the appearance of the sheep, and prevents much trouble when purging takes place, which, if allowed to remain, in warm weather will be blown by the fly and filled with maggots, which, if neglected, will spread over the body of the sheep, resulting in death.

I mark my lambs when a year old, at shearing time, using Dana's patent label, by the numbers. I can keep their ages and their breeding correctly.

TICKS.

If annoyed with sheep ticks (about two weeks after shearing, the ticks will all leave the older sheep and go to the lambs), by dipping the lamb in a solution prepared of Buchan's carbolic sheep dip, you destroy not only the tick but the eggs.

BUTCHERING.

Many persons do not eat mutton because of the peculiar sheepy odor and taste sometimes found in the mutton, and attribute it as being due to the contact of the wool with the meat. This is a mistake. The true cause of this taste or odor lies in the delay of disemboweling the carcass. If the intestines are allowed to remain until the pelt is removed, the gasses emitted from them are disseminated through the flesh, which causes the objectionable taste or odor. Disembowel the carcass *at once*, before the pelt is removed. Or, as soon as the throat of the animal is cut, having it tied up by the hind feet with its head hanging down, cut a hole between the hind quarters, and *fill the body at once with cold water;* then take the pelt off at your leisure, and remove the entrails, and you will have none of that disagreeable odor.

HOW TO MAKE WOOL UNIFORM.

One thing of which I thought, but it escaped me at the proper time, is this: The sheep should be kept in *uniform* condition to produce good wool. If the condition of the sheep is kept uniform, the wool will be uniform. If the sheep are allowed to grow poor and then suddenly fatted, or *vice versa*, the staple of the wool will change in the same way. With combing wool, it injures it materially, as where the weak places are it gives way, destroying its value as combing wool. Fat sheep make fat wool. Wool from sheep kept in good, uniform condition, will be uniform throughout, and the yield from the same sheep greater, longer, stronger and heavier, having more yolk.

In writing, I endeavored to give you my idea, and the reasons for it, of the best sheep for Tennessee, as a whole, and at the same time utilize the natives, which are now comparatively worthless. There are breeders of the Downs—Southdowns, Shropshiredowns, Oxfordshiredowns, etc., etc. For a medium wool and high-flavored mutton, these sheep are exceed-

ingly valuable, but for wool and mutton combined, where carcass also is desired, the cross I have mentioned I think is decidedly preferable.

Sheep sometimes shed their wool, and I have heard old farmers attribute it to feeding them corn. Such is not the true cause. Any sudden change—if suddenly fatted from poverty, or allowed to become rapidly thin from good flesh, they will shed their wool. If from any cause they are sick, causing them to have fever, as from garget, swelled udder, caused by loss of lamb, they will shed their wool.

I said nothing about feeding or grazing; every one will control that to suit himself; nor as to the dogs, which is the greatest obstacle of all to successful and profitable sheep-raising. The more we can get interested in sheep, the fewer friends the dog will have.

The following essay, also written by Mr. Crutchfield, though going over some of the same ground, is well worthy a place in this treatise:

Gentlemen of the Stock-breeders' Association:

Your president, Mark S. Cockrill, has done me the honor to impose upon me the duty of preparing an essay on Sheep Husbandry in Tennessee, to be read before your convention. I would have much preferred that the duty should have fallen upon some one more competent to do justice to the subject, and of greater experience than I have.

As farmers and breeders of live stock, we owe to each other our experience in our various vocations that we may each reap the benefit of the other's experience. This interchange of opinion can better be attained through organized associations of farmers and breeders, like that of the Stock Breeders' Association, and through the agricultural press, to which we all ought to be, if we are not, subscribers *and contributors.*

Sheep husbandry had its origin co-existent with man, and has co-extended with him through all the various ages to the present time. It is not, however, with its ancient history that we have now to do, only in so far as it assists us in tracing back the breeding of the many species or varieties of the present generation, and accepting those best suited to our purposes.

Strictly speaking, there is no sheep indigenous to our continent, unless it be the Rocky Mountain sheep, and that, I believe, partakes more of the nature of the goat than the sheep. The sheep most numerous with us, called the Native, or the Scrub, are of foreign origin, brought over to this country by our ancestors from different portions of Europe, each bringing the favorite breed of their immediate district, and from them sprang the race of sheep now known as Natives.

From no *care* at all in breeding, except to let them breed indiscriminately among themselves, without any regard to improvement, their *type*,

as a *breed*, is as well fixed as any of the carefully bred European breeds; they can be selected from any other breed by the most casual observer. This is the breed of which probably nine-tenths of the sheep of the State are composed, and this being the fact, it must be the basis upon which all improvement must be made, so as to utilize what we now have. Now, how shall this improvement be made? Simply by using upon our native ewes rams of the long-established and improved breeds. We have of these, bred by our own breeders, to select from, the Merino, the Southdown, Shropshiredown, Oxfordshiredown, Leicester, Cotswold, etc.

Each breeder must determine for himself what improvement he desires, or for what purpose he shall breed—whether for wool alone, and if for wool alone, whether fine, medium or combing wool; or whether for wool and mutton combined, or for mutton alone, or for whatever purpose he may desire, and select the breeding ram accordingly, and breed *continuously for the purpose desired.* I am of opinion that the best general-purpose sheep we have are from careful selections and judicious crosses. Witness the improved Leicester, Cotswolds, Shropshiredowns and Oxfordshiredowns. And even with the Merino and Southdown there are many shades brought about by the peculiar fancy of the different breeders, breeding for different and specific purposes. It is true these breeds have become perfect breeds within themselves, and yet none of them combining all that may be desired.

Beyond doubt, the Merino is the most ancient race of sheep now existing with us, and is probably more diffused throughout the world than any other breed of sheep, having been used advantageously in crossing upon breeds of localities, soils and climates different to that from whence it originally came, occupying prominent position over both continents and on the isles of the seas. Next probably in the purity of their breeding is the Southdown, which has existed for centuries in England, and their kindred races, the Shropshire and Oxfordshire Downs—crosses of the Down family with the larger, long-wooled breeds, which are of more recent origin. Then we have the long-wooled breeds, Leicester, Lincoln and Cotswold. Mr. Spooner, in speaking of the Cotswold, says, "they were formerly bred only on the hills, and fatted in the valleys of the rivers Severn and Thames, but afterwards in the Cotswold Hills of England," from which I presume they take their name. The Cotswold have been greatly refined and improved from their original state by judicious crosses with other long-wooled breeds, principally the Leicester. This breed of sheep, the Leicester or Bakewell, some writers say, were originally of the Lincolnshire breed, noted for the quantity of their wool and coarseness of their mutton. Mr. Bakewell, of the Dishly farm, England, by judicious selections and a steady adherence to certain principles of breeding—breeding for a specific purpose—perfected what is known as the improved or new Leicester, which ranks very high among the long-wooled breeds of England and America. Robert W. Scott, near Franhfort, Ken-

tucky, originated a breed of sheep, known as the Improved Kentucky, very much as Mr. Bakewell did the Leicester, and produced a sheep very similar to the Leicester.

I am of opinion, and that opinion is predicated upon a practical experience of over twelve years, that the breeder can breed in sheep just what he desires. In Tennessee, with our great diversity of soil, climate, pasturage, etc., by judicious crosses upon our natives, we can furnish a counterpart for every race of sheep valuable for its fleece or mutton, if we give our time and attention to the breeding of such as may be desired or suited to each locality and for each purpose. Some may prefer medium wool and carcass, with superior mutton of high flavor—these would probably select, to improve their flocks, some of the Down family. I believe this race of sheep is considered superior in the quality of their mutton to all other breeds. As the partridge, quail, etc., are to birds, and the trout, salmon, etc., are to fish, so is the Down to mutton.

Others who prefer a large carcass, quantity without especial regard to quality, and a great yield of wool, will select some of the long-wooled breeds. Others, who prefer finer wools and a medium carcass, will select some of the Merino breeds.

As a general thing in Tennessee, it is not so much the quality as the quantity of of carcass desired; very little difference, except in especial localities, is made in the quality of mutton, just so that it is in good condition, and the larger the carcass the greater the profit.

Many breeders, particularly in Middle Tennessee, rely for a portion of their profits upon early lambs for Northern markets—the lambing season (from November to February), on account of our mild climate, being months in advance of our less favored Northern borders, enables our breeders to get the cream of the market.

This branch of sheep husbandry has been very remunerative to those breeders who have adopted it, breeding the comparatively inexpensive native ewes to come of the imported English breeds. In my portion of the State—East Tennessee—with the line of railroads that we now have, by which we can reach the markets of Washington, Baltimore, Philadelphia and New York, and with the road now in course of construction, and soon to be completed—the Cincinnati Southern Railway—connecting Cincinnati with Chattanooga by *one line* af road, certainly gives to that portion of the State, for this branch of the industry, market facilities unequalled. A car-load of lambs could be transported from Chattanooga to Cincinnati in twenty hours, and from there could be distributed to the markets offering the greatest inducements. This line of railway is, for ninety miles, at the base of Walden's Ridge, thence crosses the Cumberland Mountain, through Tennessee, into Kentucky, bringing at once into easy access to markets the great table-lands of the Cumberland Mountain and Walden's Ridge, (which is a spur of the Cumberland), where, in time, will be the finest sheep-walks in the world. This road will also open up to the mar-

kets of the world the vast deposit of minerals along its line so long lying dormant, new mines will be opened and worked, new manufacturing establishments built, giving employment to thousands, and furnishing a home market for the products of the country.

But to return: Whatever course may be determined on by the breeder, the utmost importance should attach to the selection of the ram to be bred to, for in the purity of his blood is represented the improved type that is desired. The purer the blood of the ram the more strongly will his characteristics overcome the subsequent mixture of breeds, and imprint themselves upon his offspring. Then in selecting the ewes to breed from, avoid as much as possible any defects you wish to obliterate, selecting ewes of the best form, size and constitution. It has been aptly illustrated by a writer on this subject, as "in giving motion to a projectile (for instance, a cannon ball), the velocity obtained is not merely in proportion to the propelling force, but also to the resistance of the medium through which the body is driven." Now in this instance the ram would, represent the propelling force, the ewe that of resistance, since if there were no obstacle on her side the complete effect would be realized by the faithful reproduction of the improving type. Clearly, therefore, the influence of the ram upon the offspring will be the stronger, the purer, and more ancient in the first place that his own race may be, and in the next place the less resistance is offered by the ewe through the possession of those qualities of purity and long descent which are so valuable in the sire. But after all care and diligence may have been used in the proper selection of rams and ewes to improve the breed, ill results, and probably failure, will follow, unless a like improvement in keep and management accompanies. The great improvement of the English breeds, to which we must resort for the improvement of our breeds, is greatly due to their excellent management and keep. Proper attention to the selection of rams and ewes, and an annual culling of the flock, which is best done at shearing time, when any deficiency may be detected, and the defective ewe marked for the mutton pen, culling out and disposing of the less perfect ewes, and keeping only what can be well cared for, properly sheltered if needed, and provided with good pasturage or feed, and good management have given to others their improved breeds, and will give to us ours.

Tennessee, by the census of 1870, had about 800,000 sheep, producing about two pounds of wool per head, or 1,600,000 pounds. If these sheep were half-breeds of any of the improved breeds, the yield of wool would be at least double, or four pounds per head, or an increase of 1,600,000 pounds, which, at 20 cents per pound, would gain to the producer $320,000, and in a short time, by proper breeding, as indicated, could be increased to an average of six pounds per head, or an increase of 3,200,000 pounds, which at 20 cents, would gain $640,000.

Probably one-half of these sheep are sold or consumed annually for mutton, estimating them to average in weight 60 pounds, and to sell at 2

cents per pound, would bring $480,000. Now the use of the improved rams would increase the carcass fifty per cent., or to 90 pounds each, and the value of the mutton fifty per cent., or at 3 cents per pound, giving a gross income of $1,080,000, or a gain in mutton alone of $600,000—thus you would have an increase to the revenue of the farmers and breeders of sheep from wool and mutton alone, about one and one-fourth million of dollars, and that without adding one sheep to the flocks of the State—enough to pay the current expenses of the State and the interest on her bonded debt *at the scale.*

In making these estimates I have placed them far below the actual weights and sales of imported mutton sheep. My own mutton sheep, the past season, averaged 166⅔ pounds, (nearly double the estimated weight). After clipping 10⅔ each of wool, which sold for 37½ cents, nearly double the estimate on wool, and the mutton sold for 6 cents per pound, just double the estimated price.

Increase the number of sheep improved, to the capacity of the State, and give to the sheep raiser proper protection by law, and the beneficial results would be almost incalculable. In one sense of the word, sheep husbandry may be classed among the smaller industries of the State, because it is so economical in all its bearings, and so little capital is required to engage in it, even on an extensive scale. Yet in the aggregate it is, or ought to be, one of the greatest industries of the State. The small amount of money that can be put into sheep husbandry by any one person, sufficient to stock their farms, is one of the principal objections urged against it by men of capital—while they admit that there is no live stock, which the farmer handles, which pays a better dividend, in proportion to the capital invested, than sheep, yet the income, in the aggregate, is too small. Herein is where the profit of sheep husbandry will be to the masses of the farmers of the State. With very little outlay of money each farmer can add to his live stock as many sheep as he may desire, or can properly handle in conjunction with the other duties of his farm, "here a little and there a little" will the profits accrue, each sharing his portion, and the industry will be so greatly diversified there will be the greater assurance of protection.

Our Supreme Court, although some of our Judges held to a contrary opinion, decided against the constitutionality of the dog-law, which was one of the best laws ever enacted by the Legislature, and although it has been repealed, and it was in force but a very short time, its good effects in ridding the State of many worthless dogs, and the saving of sheep was great, and is still manifest, without saying any thing about two hundred thousand dollars or more that was paid into the State Treasury from this canine luxury.

The farmers of the State should not rest until they get protection by law for this industry. Within my knowledge parties from the Northern States, who want to come to Tennessee and engage in sheep husbandry on

a large scale, are deterred from doing so alone from fear of the dogs. Some protective laws can be enacted that will be constitutional. As the law now is, any one is liable to the owner for killing any straggling dog. A law giving the right to kill, without liability, any trespassing dog, would be a good step in the right direction, and assist materially in the protection of sheep

As will be seen by reference to the breeders' directory of our agricultural papers, we have breeders in Tennessee of all the improved stock—horses, cattle, sheep, hogs, etc. If you want either a race horse, trotting horse or saddle horse, a lordly Durham to improve your beef cattle, or a little Jersey, should the madam have a fancy to excel in golden butter, or the beautiful Devon, which, for all purposes, milk, butter and beef, is hard to excel, or any of the improved stock, you have only to refer, as indicated, to know where to get them. Our breeders have been at great expense in importing, rearing and acclimating improved stock, and it is to the pecuniary interest of the farmers of the State to sustain them, and save to themselves the heavy tax incident to transporting live stock singly from a distance, and the risk in acclimating them afterwards.

The effect of climate is probably greater upon the improved sheep than upon any other of the imported, improved stock. It is, therefore, better to purchase rams desired to improve our flocks from those raised in and inured to our climate. With me the only trouble with the imported sheep has been to pass them safely through the first summer, while those of my own raising have been as healthy and hearty as the native sheep.

But, gentlemen, I have already trespassed too far. Your President, in his letter addressed to me did me the honor to say that he knew "I had made money out of sheep," and requested that I "tell them how to do the same thing." I presume he did not mean this intelligent body. That would be like "carrying coals to Newcastle," as I am but a novice in sheep culture, compared with some whom I address, but to the general farmer who has given it but a passing notice, what I have said, or may say, may be of some advantage. I do not know that I can tell them how to make money out of it, but I can tell them how I have done so.

Without any knowledge (or very little) of the industry, except what I could gain by reading the authorities on sheep, and the experience of others, as expressed through the agricultural press, I began sheep husbandry in 1864, by the purchase of twenty native ewes, for which I paid $100—war prices—the same could be bought now for $25. I bred these ewes to a Spanish Merino ram. Why? Because the Merino was a native of a climate similar to that of Tennessee—was acclimated—was of a long established breed—possessing a dense coat of fine, soft wool; all of which I wished to perpetuate in my cross, and cover the naked places of my natives. In this I succeeded, and got a sheep yielding from four to six pounds of fine, soft wool, with carcass considerably increased, and a greater aptitude to take on flesh. I then desired a larger carcass, with the staple

of my wool longer, and the yield greater, combing wool bearing the best price; hence I bred my half-breed Merino ewes to a long-wooled ram, and succeeded in getting what I desired, and still retaining the fineness of the fibre and softness to the touch, so characteristic of the Merino—as also the density of fleece. I have continued to the present time to breed to none but improved Cotswolds, adding to my flock at intervals, Kentucky-raised and imported Cotswold ewes and rams, and breeding the imported ewes to the same rams. Neither the imported ewes nor their offspring (and for the ewes I paid what was considered fancy prices) are superior to those of my own raising, but, in fact, those of my own raising are superior in health, carcass and yield of wool, to the imported—all receiving the same care and attention, which I know was not so good as that received by the imported ewes before I purchased them, as they doubtless had been pampered and handled with great care. The less kind treatment they received in taking their chances with my flock, and not being acclimated, had its effect upon them.

Annually, at shearing time, I cull my flock, and take out all ewes and lambs that are less perfect in form and fleece, or in any respect inferior, and place them with the mutton sheep, keeping to breed from none but the best.

I give my flock good attention. They have access to an open shed, and salt all the time. I change their grazing ground often, and endeavor to keep them in *uniform* condition, as that makes uniform wool. Any sudden change from a fat to a poor condition, and *vice versa*, strengthens or diminishes the fibre of the wool, which detracts greatly from the value of the wool, frequently rendering the long wools valueless as combing wool. If the sheep becomes poor when the fleece is about half grown, and then fatted, the wool inevitably tells it, as at that point where the poverty of the sheep was shown, so will it be shown in the wool being much weaker than the other portions of the fibre grown while the sheep was in good condition; this same cause, as also any cause from which they have had any fever, will cause them to shed their wool. I have heard it said that the feeding of corn to sheep made them shed their wool. No doubt it is true, as the corn brought them rapidly from poverty to flesh, the sudden change causing the shedding of wool, which, rightfully, is attributed to the corn.

I never breed in-and-in; never use any but mature rams. It is false economy to breed to a lamb, because he can be bought for a few dollars less, and it is a positive injury to the lamb. I never allow the ewe lambs to be served by the ram until the fall previous to two years. I permit the ram to run with the ewes from August to November, when he is taken from the ewes and lotted to himself, otherwise lambs would be coming at inopportune times. A ewe that loses her lamb in the spring is very apt to be served by the buck if he has access to her, within a short time after such loss, which would cause her to drop a lamb in the fall, making it difficult to carry her and the lamb through the winter, with loss of lamb

from her the succeeding spring. One mature ram to about fifty ewes, with a little grain twice a day, as his attention to the ewes prevents his grazing, and without extra feed would cause him to decline in flesh and strength, and be less able to perform his duties. In summer they graze upon my meadows and grass lots, destroying noxious weeds, briars, etc.; in winter upon the winter grazing oat, and are fed only when the oats are too wet to graze or the ground frozen; they are then removed to sod ground, and if necessary, feed hay or grain. In the spring of 1877, I sowed a field to clover; during the summer the rag weed was about to take possession of it and smother out the clover. I cut it and cured it, and stored it away in the shed, salting it as I hauled it in; upon this the sheep have principally fed this winter, preferring it to the best timothy hay. I market my mutton at home markets and my wool in Boston. My flock averages about nine pounds each, of fine combing wool, not surpassed by any, and retains the fineness of fibre and softness to the touch transmitted by the Merino. I sent samples of wool from sheep of my own breeding, and samples from an imported Cotswold, to Boston for comparison—the preference was given to that of my own breeding, it being equal to the imported in every respect, and superior in *strength* and *fineness* of fibre. I would prefer to market my wool at home, but from some cause there is too great a margin between the home and the Boston market. It costs me, in commissions and freight less than three cents per pound to market it in Boston.

My ewes are now lambing, in which they have heretofore been very proficient. At one time 23 ewes brought consecutively, 47 lambs; 22 having twins and the 23d triplets. In 1877, 50 ewes raised 79 lambs.

Since 1866 I have received for sheep and wool sold	$ 3,974 00
I have now on hand 100 head, which I could not replace by purchase for	1,500 00
Value of flock and increase from it	$ 5,474 00
I have expended for breeding ewes and rams	657 50
Leaving a gross profit for 12 years, of	$ 4,816 50

or over 60 per cent. per annum upon the capital invested, supposing the same to have been invested at the beginning, while about one-half of it has been invested in the past few years.

I have said nothing as to the cost of keep, or the benefits derived from the sheep, but taking one-fourth of the gross profits, which is about $1.50 per head per annum, without giving to the sheep any credit for benefits desived from them, which are many, and there is still left over 45 per cent. per annum for twelve consecutive years.

I have sustained losses by dogs, by accident, by theft and by disease, the latter principally with lambs—but none of the diseases incident to European flocks have troubled me. With dry grounds, proper attention

to grazing and feeding, and salting, with shelter during inclement seasons, my flock has kept quite healthy.

I do not believe such profits can be realized upon sheep on a large scale, or even with a smaller number, if the husbandman relies upon the *breed alone* (to make his profits) without giving them proper care and attention. But I am sure that the farmer of Tennessee who will use ordinary judgment in making his selections, and ordinary care in handling his flock, adapting the same to the capacity of his farm, will reap a greater profit in proportion to the capital invested, than from any other source. His flock will be to him better than Government or State bonds, returning to him annually, or semi-annually if he desires it, coupon fleece, far exceeding in interest any Government or State bond, with no fear of repudiation constantly staring him in the face, and with the proud consolation that it is the result of his own care and attention, and not wrung from the sweat and blood of the toiling millions.

AMNICOLA, Feb. 5, 1878.

FROM D. M. JONES, SHARON, TENNESSEE.

J. B. KILLEBREW, *Commissioner, etc.*,

Dear Sir—I received your circular at a late date. In reply I will say, sheep raising is much neglected, taking our facilities into consideration. Permit me to speak a few words from experience. Last winter was the hardest on stock we have had for several years, and I personally know of a flock of sheep that ran in the woods all winter, without feed or attention, but am not able to state the loss. In May my attention was directed to a portion of said flock, numbering fifty-two head, old sheep, ewes and wethers, with fourteen nice young lambs, with a good prospect of raising them, the older lambs having died before vegetation afforded sufficient grazing for the ewes.

I estimate the wintering on cotton seed and crushed corn six months through the winter at 75 cents each, giving them all they will eat, in connection with rye and other winter grazing.

In August last I purchased one pair of sheep, of J. B. Hill, Franklin, which cost $17.00. I then selected 32 scrub ewes at $1.50 each. Total cost of stock....	$65 00	
Wintering 33 head at $1.00 each	33 00	
Interest on $98.00 at 10 per cent.....	6 50	
		$104 50
Lost one ewe from natural causes, one by abortion, one killed by accident, one from castration, and two lambs when three days old. Now on hand 65 head. Value of buck.....	$17 00	
31 old ewes and 12 wether lambs at $1.50 each.....	64 50	
16 ewe lambs at $2.00 each, and 5 bucks at $3.50.....	49 50	
Wool clipped from 32 ewes and buck, 131½ lbs., at 25c.	33 63	
		$164 63
Net gain.....		$ 60 13

FROM MAJ. GEO. T. ALLMAN.

STOCKWELL, MARSHALL CO., TENN., July, 1877.

J. B. KILLEBREW, *Commissioner of Agriculture, etc.*

In reply to your letter of the 25th ult., I do not know of any stock kept on a farm that is more profitable than sheep. They pay two dividends a year—lambs and fleece—besides a daily dividend of manure, and are indispensable on a stock farm to keep down weeds, bushes, etc.

I do not know how I can better illustrate the profits than by giving a recent occurrence. A gentleman had seventeen very inferior sheep, sold them for $20, and gave that money for a very fine ewe, then with lamb. This was three years since. He received $62.50 for two lambs sold and the wool. I paid him $100, a few days since, for the original ewe and nine others—all her produce and descendants. He lost several lambs by the severe winter of 1876-7; never provided any shelter, and never fed them one bushel of grain.

My best ewes pay me annually an average of $25 per head (sales of lambs and wool).

The second question is more difficult to answer, as all depends upon the number of other stock kept on the farm, and whether luxuriant pastures or a scanty bite. There is neither profit nor pleasure in handling *inferior* stock, and there is no pay in short grass. From three to four sheep to one acre of grass can be well kept with other stock in such quantities as are usually kept on our farms.

For mutton, the Southdowns have no equal. For carcass and fleece combined, I prefer the Cotswold. When large flocks are proposed to be kept, I would give the preference to the Merino. I prefer the Cotswold from the fact there is more demand for them and they pay better. I find that sheep and all other stock do best and pay most when protected from sleets, snow, etc. When there is plenty of grazing they require very little feed. I think it advisable to change their pastures, and they should have salt, water and shade free of access. During severe winter I feed one ear of corn per day to each sheep, and when the ground is covered with snow, all the hay they will eat. Sheep properly cared for seldom have any disease with us. If kept in good flesh, they are seldom annoyed with "sheep ticks." A tobacco dip will rid them of ticks. It is an excellent plan to bore holes with a two-inch augur, fill the holes nearly to the top with salt, and put pine tar around the holes, so that when the sheep lick the salt they get the tar on their noses, and are not much annoyed by the fly in summer. Early lambs should be clipped in July, which renders them less liable to disease. This applies more especially to the long-wooled sheep. When the fly annoys them, the lambs run from tree to tree and get very hot and perspire very much, then lie down on damp

grass and get chilled, their fleece being so long their carcass does not "dry out."

In answer to your question as to the number of sheep killed by dogs, I answer that I believe one-fifth are annually killed or maimed by dogs in this vicinity. This is the great barrier to the profitable raising of sheep, and as our wise solons love the dog more than the sheep, and as our present law is wholly insufficient to give the owner of the sheep any protection, I see but two ways to remedy the evil. 1. To make it a rule to kill every straggling dog found on the premises 2. To make the land-owners responsible for all sheep killed by dogs that are around or kept by those in their employ or living on their land. I think we would not then, as now, have from two to five worthless curs to every freedman or tenant.

SHEEP-HUSBANDRY IN EAST TENNESSEE.

BY J. W. F. FOSTER, LL D.

The permanently remunerative industries of every country will be determined by its physical peculiarities of soil, climate, and topography. Governmental interference and other temporary circumstances may, for a time, turn them into unnatural channels, but ultimately they will assume or revert to those channels which nature has pointed out. Of this truth East Tennessee is a notable illustration. The unwise devotion of the Gulf States to the almost exclusive production of cotton created a near and profitable market for our cereals, and to supply it their production was stimulated to the utmost. Our devotion to grain was as exclusive and as unwise as was their devotion to cotton. As a consequence, after half a century of uninterrupted grain-growing, we have reached the point that, away from the river bottoms, few farms are profitably productive, and large numbers are utterly exhausted. The lands and their owners are gradually growing poorer. And so they will continue until a radical change is introduced into our system of husbandry. It is not a matter of choice, but one of necessity. The character of this needed change is

plainly indicated by the physical elements of the country. They are the same as those of Spain, the oldest and most extensive wool-growing region of the world; they are the same as those of California and Australia, which, in our day, are as yet her only rivals. High ranges of mountains to the north and the south of us, furnishing shelter from arctic cold and torrid heat; the intermediate space furrowed into innumerable ridges and valleys; a dry soil, but an abundance of the purest living water; a climate strictly temperate, where all the valuable grasses flourish in perpetual verdure; an atmosphere saturated with all the elements of health; such are its chief characteristics, and such is the paradise of the sheep. Notwithstanding these great natural advantages, we do not produce over the sixth part of the wool consumed by our population. The number of our sheep is scarcely equal to half of our population; we have but one sheep to every eight acres of our improved lands; one to every forty acres of our entire territory. Our number is but a small fraction of what it could and should be, as may be seen from the following statistics: Spain, with neither a soil nor climate equal to ours, has two sheep for each of her population, and one to every five acres of her territory. The State of Vermont keeps one sheep to every four acres of her territory, and three to every one of her population. New York has one sheep to every seven acres of territory; Ohio, one to every six acres. The proportion of horses and cattle in the two last mentioned States is also fully double that of Tennessee. If in these States, where sheep-husbandry is not the chief occupation of the farmers but merely incidental to their other occupations, where the climate is so rigorous as to require feeding from three to six months in the year, and where the price of land is upon an average fourfold that of ours, such numbers of sheep are maintained, how much better could be our own showing if our people were only wisely alive to their own interest. The assessment rolls of East Tennessee show an aggregate in round numbers of eight and one-half millions of acres, of which not quite one-fourth is returned as improved. Without materially interfering with other agricultural operations this territory could support two and one-half million sheep, which, at a low estimate, would yield in money three-fourths as much as the entire crop of wheat, corn and oats, basing the calculation upon the census report of 1870, and taking the average price of wool and grain for the last five years. In other words, the income of our farmers would be nearly doubled, with but little additional labor and expense. From our own experience and that of a large number of farmers who do raise sheep, we believe that the results would be considerably above our estimate. Moreover, this estimate does not include the value of the manure as a fertilizer, of which more will subsequently be said.

If this representation is correct, the question naturally occurs, why do not our people engage in the business? There are, it seems to us, three chief reasons. There exists in many minds a prejudice against the sheep;

there is a natural reluctance to change from old ways and habits which have been handed down from father to son; but more than all else, is the want of adequate and permanent legislation to protect the sheep-grower against his most deadly enemy, the dog. Against a prejudice and a feeling the weapons of reason are powerless. People cannot be argued out of them; they must outgrow them. But when this growth has once commenced it is generally rapid, and from all the information which we can derive from the various counties in this division of the State, it has already proceeded so far that, but for the want of adequate legislation, our people would largely embark in the business.

THE DOG,

more than any other one thing, is keeping East Tennessee poor. If, according to the Spanish proverb, beneath the foot of the sheep is prosperity and wealth, beneath that of the dog is decay and poverty. From data furnished by the assessment rolls, we have in this division of the State at least sixty thousand dogs. If before the tribunal of Reason and Common Sense an indictment were preferred against these dogs as a public nuisance, such an array of charges could be made and sustained as would insure a verdict of guilty, and with scarcely any palliating circumstances for an appeal to the mercy of the court. It would be proved that the food consumed by each dog would produce one hundred and fifty pounds of pork, which would aggregate nine million pounds, worth, at the lowest estimate, five hundred and forty thousand dollars. It would be shown that the destruction of property by them annually averages, but little less than that produced by fire and flood. It would be shown that, in consequence of their evil disposition, our farmers are deterred from engaging in the raising of sheep, by which a loss of revenue is caused to the people and to the State of at least five millions of dollars annually. It would be shown that large numbers of immigrants, with money in their purses and brains in their heads, are prevented from settling among us and helping to build up the country, from the fact that these dogs render it too hazardous to embark in the only agricultural operation that offers a reasonable prospect of profit. It is a crime against the dignity and welfare of the State that such a nuisance should exist.

THE PROFITS

of sheep-husbandry, like those of every other business, will greatly depend upon the skill and attention with which it is conducted. In estimating them, three elements are to be considered—the wool, the mutton, and the manure. There are several ways of estimating these profits, all of which are very approximately correct and whose results closely harmonize. We will first compare them with those of corn and wheat upon our lands of

average fertility. The account with an acre of corn would be about as follows:

Plowing and planting	$2 00
Cultivating and harvesting	2 50
	$4 50

Twenty bushels at 50c. per bushel, $10—leaving a profit of $5.50 per acre.

With an acre of wheat it would stand:

Seed	$1 00
Plowing and sowing	2 00
Harvesting and threshing	85
	$3 85

Eight bushels, at $1 per bushel, $8—leaving a profit of $4.15 per acre.

The same land would support five sheep to every two acres:

Wool, 4 lbs. per head, at 40c. per lb	$8 00
Four lambs, at $1.50 per head	6 00
	$14 00
Expense at 60c. per head	3 00
	$11 00

Leaving a profit of $5.50 per acre, being equal to that of corn, and exceeding that of wheat by $1.35 per acre.

Our estimates of the profits of the corn and wheat are full high, larger than will be generally realized; that of the sheep full low, much less than would be realized with good sheep and proper management.

Another method of estimation is the rates at which sheep are loaned. In some States it is quite common for moneyed men to let out flocks of sheep to those having less means. Sometimes a flock of ewes is thus loaned, to double in four years, being a rental of 25 per cent. per annum. More frequently they are let for two pounds of wool per head annually, returning the original number. If the ewe is worth three dollars, and wool forty cents per pound, this would give a rental of $26\frac{2}{3}$ per cent. per annum.

No man can rent land at 25 per cent. of its value per acre, keep it up, and, after a series of years, return it in as good condition as when received. A clear interest of ten per cent. would make land the most profitable investment that could be made.

All of these estimates show that sheep-husbandry is more profitable than grain. But we are satisfied that in this climate, with good breeds of sheep and with the right management, our lands can be made to yield at the least fifty per cent more than our estimate. We have assumed our sheep to yield four pounds; they can be easily made to reach six and eight pounds. We have assumed that our lands can carry but two and one-half sheep to the acre; they can carry three. We have assumed that

every hundred ewes give eighty lambs; they can be made to give from one hundred to one hundred and twenty. We have assumed that the lambs bring $1.50 per head; they can be made, as mutton, to yield $3 per head net. Moreover, we have left out of the consideration the manure, which, at the lowest estimate, is worth fifty cents per head. In corroboration of our estimate, we would state that we have taken pains to obtain the opinion of sheep-raisers upon this point, and though their estimates differ from each other, all agree that it is the most profitable part of their farm operations.

No estimate of the profits of this business is complete without a consideration of the value of

SHEEP AS FERTILIZERS.

This is a matter of special interest to the farmers of East Tennessee, to whom the recuperation of their exhausted fields is a subject of vital importance. Chemical analysis shows the manure of the sheep to be richer in the elements of vegetable growth than that of the horse or cow. Its nature and method of distribution insure nearly its entire utilization, while that of these other animals is, to a large extent, wasted. In England it is held to be worth over a dollar per head. In this country it is commonly placed at fifty cents. Our own estimate would be much higher. In the absence of a record of exact experiments by others, we may be excused for referring to two of our own made this year. Our sheep are folded every night, summer and winter, in an enclosed shed, with a paled yard attached. The shed is kept well littered, and the yard scraped once or twice a week, the scrapings being thrown into the shed. Last August the manure from ten sheep for the year was spread upon a quarter of an acre of my thin land. The piece was then sowed to turnips. Though the season has proved very unfavorable, it promises a yield of at least the rate of 250 bushels to the acre. Without the manure it would not yield fifty. The manure of these ten sheep will make me fifty bushels of turnips; its effects will be larger next year, and will be very perceptible for the two or three succeeding years.

This summer the scrapings from a yard in which twenty sheep were folded, have amounted to about four bushels per week, or about ten bushels per head for the year. In May one bushel of these scrapings was sown in a ridge of sweet potatoes, ten rods in length. As compared with the adjoining rows the effects throughout the season have been visible; and judging from the few that have been already dug, the yield will be increased at least three pecks, or an increase of sixty-six bushels to the acre. The nightly manure of twenty sheep thus saved and used would cover an acre and a half of land, and increase the yield one hundred bushels. And furthermore, the force of the manure is far from expended on the first crop. This is the result of only half of the sheep's

manure, the balance being spread on the pasture. From these and other experiments made by me, I am positive that the manure of one sheep is of more value than one hundred pounds of guano, which will cost at least three and one-half dollars. Too little value is generally attached to this element of profit; probably from the fact that our fathers tilled the land in all its virgin fruitfulness, and did not feel the need of it, and we are still encumbered with their ways of thought and action. But many of our best farmers are beginning to discover that, if the manure is their only clear profit on stock, it nevertheless pays.

The profits of sheep-husbandry will largely depend on

THEIR MANAGEMENT.

No animal will endure neglect and thrive under it equal to the sheep; and no animal will respond more generously to extra care and attention. It is the prevalent idea and practice that sheep must take care of themselves. Hence small sheep, little wool and no profit. It would be as reasonable to expect a good crop of corn without cultivation as to expect a good crop of wool or mutton without the bestowal of proper care upon the producers of them. Sheep will thrive in the summer season on almost any of our pastures and old fields; it is consequently for the winter that provision is specially to be made. And herein lies one of our chief advantages as a sheep-raising State. In the North they must be fed on artificial food from three to six months in the year; here they need require it scarcely as many days. In New York or Michigan it will cost from $1.00 to $1.50 per head to winter them; here they can be wintered equally well at a cost of from twenty-five to fifty cents. The course which I would recommend, founded on my own experience and that of many of our most intelligent and successful sheep-raisers, would be about as follows: Provide a field of such grass as grows late in the fall and starts early in the spring, and which will keep green through the winter. Orchard grass and red-top are perhaps the best, especially where blue grass will not succeed. Let it make a good growth in the fall. Turn on about the middle of November; and unless too heavily stocked, it will furnish an abundant pasturage till the first of February.

As early in the fall as possible, sow rye or winter oats in cornfields or elsewhere. From the first of February till late in the spring, sheep can have no better food than can thus be provided. By this method they can be kept thriving through the winter at but a trifling more expense than through the summer. But when the weather is stormy and inclement, so that they are disinclined to graze, it will be advisable to feed them some grain. At such times they need a more nutritious food to supply the animal heat which the cold and dampness so rapidly abstract. For it must be remembered that large, healthy lambs at yeaning time, and heavy fleeces at shearing time, can be expected only from sheep that have been kept in good order through the winter.

The importance of the matter will be a sufficient excuse for a brief digression upon the sowing of rye in the fall. The advantage of it is three fold, especially on fields that have been cultivated this year, and are to be followed by cultivation the next. First, a large amount of excellent feed is obtained; secondly, it very effectually prevents the washings to which our fields are so disastrously subjected by winter rains; thirdly, when turned under in the spring it is a valuable fertilizer. Its rapid decomposition furnishes heat and assimilable food to the plant at a time when they are particularly needed. Either one of these advantages is sufficient to repay the cost; the three combined make it one of our most valuable crops. In fact, as things now are, it is an essential of good farming; and it is a happy omen for the agriculture of our State that the practice is rapidly extending.

Though not a necessity in our climate,

ROOTS

are an important adjunct in the wintering of sheep. No other crop will furnish an equal amount of wholesome food to the acre. In this manner, also, a variety of food is furnished as essential to sheep as to man. It is well known that the agriculture of England has been brought to its present high standard, and is kept advancing, chiefly by means of sheep, largely supported on turnips. In our climate, as there, the crop can be left on the ground during the winter and harvested by the animals themselves. An acre of good ground will yield from 400 to 600 bushels; more than equal to fifty bushels of corn, and raised at less expense. Another important root crop, too much neglected, is the sweet potato. On fair soil productive varieties will yield from 250 to 400 bushels to the acre, equal for feeding purposes to from 60 to 100 bushels of corn; and they can be kept without difficulty till Christmas. The expense of raising them is some more than that of raising an equal area of corn, but less than that of raising their equivalent in feeding qualities. Besides, they are but little exhaustive to the soil. My own practice is to raise sweet potatoes for early feeding and turnips for late. They are moreover an excellent feed for horses, milch cows and hogs. A feed of them two or three times a week greatly promotes the thrift of these animals.

It is a prevalent belief that sheep need no protection from the weather. No idea is more erroneous. They will suffer less from the dry cold of Minnesota than from the chilling rains of Tennessee. Their fleeces become saturated with dampness, and the animal heat is rapidly abstracted by evaporation. It is the very best of economy for the saving of food, for the growth of soft and heavy fleeces, for the health of the sheep, and for the preservation and thrift of the lambs, that ample and comfortable

SHELTER

should be provided. The saving of feed and life, and the extra produce, will amount to full twenty-five per cent. Then there is to the humane

man the feeling of pleasure and satisfaction arising from the knowledge that in the midst of a wintry storm, while he himself is enjoying the comforts of a blazing fire, his sheep likewise are comfortable in their quarters. Their house should be well covered and protected from the winds. Attached should be an open yard, to which they have free access. Their house should be kept well littered. Upon one side should be troughs for feeding and salting. Many, perhaps most, will consider all this as unnecessary and useless trouble. But we say that which we do know, when we say it pays. Sheep thus sheltered will keep fat on the food that will barely sustain life in those which are exposed. Their fleeces are kept clean, lambs are seldom lost from exposure; they become gentle, can readily be caught and handled, and the state and condition of the flock are known every day. Uncared for sheep will yield some wool and mutton, but no profit. Generous profits are the offspring of generous treatment. Physical comfort and mental quietude are as essential to the well-being of our domestic animals as to our own.

Among the numerous

BREEDS

of sheep the public favor seems to be divided principally between the Merino and the Cotswold. The former yields a short, fine fleece weighing from four to six pounds; the latter yields a long, rather coarse, fleece, weighing from eight to ten pounds. The former has a small carcass, weighing from seventy-five to one hundred pounds; the carcass of the latter will run from 125 pounds to 175 pounds. Formerly the Merinos were the most popular; but of late years the increasing consumption of mutton and the demand for long wool for combing purposes seems to have turned the tide of popularity towards the Cotswold. For the mountainous regions of East Tennessee, remote from markets and lines of transportation, and where the production of wool is the chief object of the sheep raiser, the Merino may be the most desirable. But in most portions that breed will be found most profitable which yields the greatest returns both of wool and mutton. These combined qualities the Cotswold seems to possess above any other breed

But throwing the wool entirely out of consideration, it is generally maintained by sheep-growers, that, as meat-producing animals, they are more profitable than either hogs or cattle, except perhaps on rich bottom lands. Randall, an extensive sheep-farmer of New York, says it can be demonstrated that a pound of

MUTTON

can be produced cheaper than a pound of pork or beef. And several farmers of this State largely engaged in all three varieties of stock-raising, have expressed to the writer the same opinion. The consumption of mutton is fast increasing throughout the United States. In our large

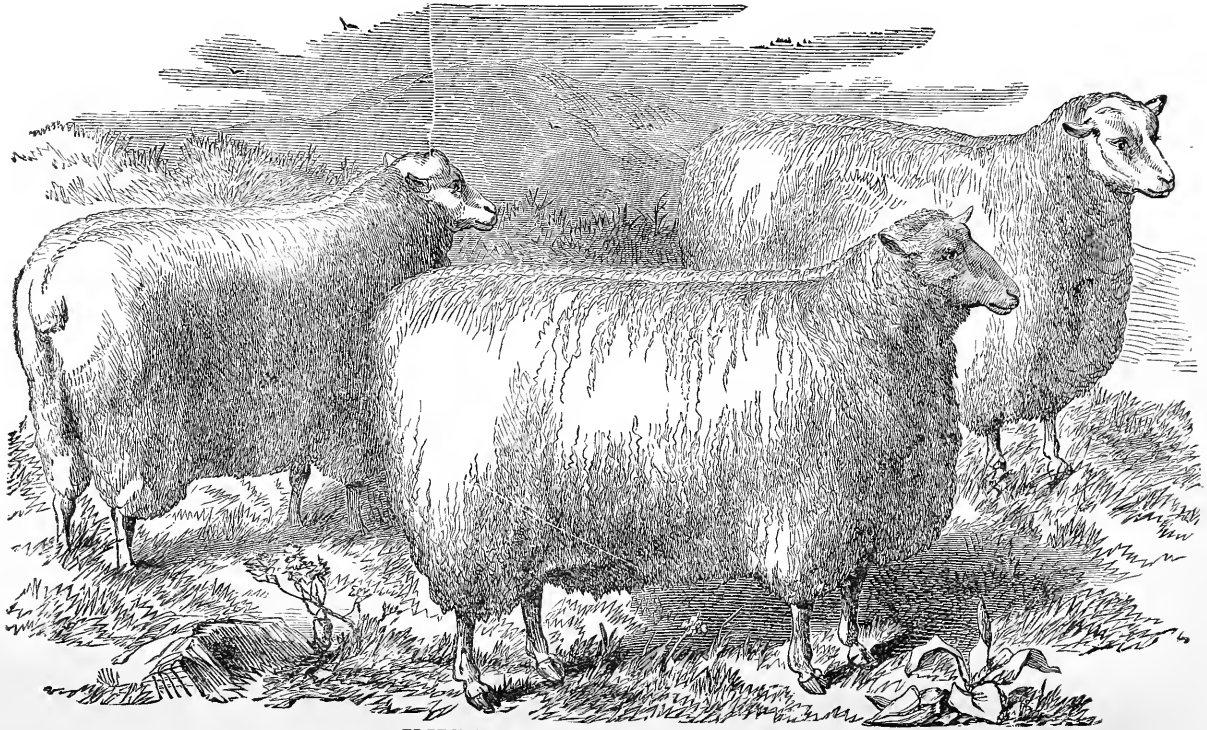
cities the demand is, as a rule, in excess of the supply; and the recent successful enterprise of shipping fresh meat to Europe will doubtless, in a few years, greatly enhance this demand. If for no other purpose, every farmer should keep a few sheep that he may have a supply of fresh mutton whenever desired. It is as wholesome and nutritious as beef, and if properly dressed, as palatable. The flesh diet of our rural population is chiefly salt pork; and so it must for a long time continue, especially during the hot months, unless resort is had to mutton. By interchanging, every neighborhood of three or four farmers could keep their tables supplied without risk of loss by the weather. It would add much to the comfort and enjoyment of the family, and perhaps cause no small saving on the score of "doctor's bills."

Information received from all portions of this Division of the State makes it certain that there is a rapidly growing sentiment in favor of sheep-husbandry. Many who have not heretofore kept sheep are starting flocks; others are enlarging; all are striving to improve their quality. Quite a number have engaged extensively in breeding Cotswolds, and they are unable to supply the home demand for pure-bred stock. If wisdom rules in our Legislature, and the dog nuisance is permanently abated or rendered harmless, it may confidently be predicted that within the next decade scarcely a farm will be found without sheep, and in the larger number of instances they will be the principal stock. Nature certainly points in that direction; and the good sense of our people cannot fail to induce them to follow at her bidding. For us there is no need of a new Argonautic expedition in search of the Golden Fleece. We can find it right here at home. Her sheep yield more gold to California than her mines. The herbage that grows upon our mountains and hillsides can yield to us and to our posterity a more enduring supply of wealth than their interiors, though traversed with Comstock lodes.

We have presented, hitherto, some of the claims of sheep-husbandry as a source of profit by the money it yields and by the fertility it imparts to the soil. But it is not upon this ground alone, nor chiefly that we would urge it upon our farmers. As a class of the community, they, their wives and their children, are overworked. Almost from the cradle to the grave they spend a life of unremitting toil. They grow prematurely old; they lack many of the rational enjoyments of life; worse than all, they are far from reaching that high standard of intellectual and moral character to which their occupation is preeminently favorable. Overwork is as bad on the health and character as idleness. Both are extremes; both are misfortunes; the one makes men useless drones, the other makes them jaded slaves. Under our present system of farming it cannot well be otherwise. The difference in the labor required on a grain farm and that on a stock farm can scarcely be appreciated by those who have not experienced it. But great as is this difference, it is no greater than that in the character of the two classes of farmers. Go to the rich prairies of

Illinois; visit a grain-growing community; then pass to the adjoining stock-growers. The contrast is so great that a dullard cannot fail to mark it. He seems to have been transported to a different world. The grain-grower is so dependent on the fickleness of the seasons and the unreliableness of human labor, that he seems to have lost all independence of character; the stock-grower, less affected by these troubles, presents an ideal of manly independence. The grain-grower sees the fertility of his lands decreasing, and with it his income, talks of selling out and moving west to fresher fields, to Kansas or Nebraska; he is filled with the spirit of unrest and discontent, and they brand their mark on his and his family's foreheads. The stock-grower sees that his lands are annually becoming richer, and in consequence his income larger; for him Kansas and Nebraska have no charms; he thinks of no change, unless it may be to buy a gold mine in California or a palace in Chicago, after he has bought and stocked all the desirable lands in his vicinity; he is filled with quietude and content, and upon his and his family's foreheads they too impress their mark. From January to December the grain-grower and his family spend a round of constant toil. Too busy in the daytime, too fatigued at night, they neither study nor read. Of the literature, science and art of the world, they know little, care less. Their intellects become narrowed and dwarfed, incapable of a noble thought or a generous feeling. The stock-grower and his family, with more of leisure and less of wearisomeness, find time for reading and for society. Their taste becomes refined, their intellect expanded. Books and periodicals become a luxury and a necessity. An interest is created and cultivated in the affairs and the thoughts of the great world lying beyond the horizon of the belfry of ther village church. In their views of things they become cosmopolitan, noble in their thoughts, generous in the impulses of their hearts. This contrast is not exaggerated. All intelligent travelers will perceive its truth. The writer has marked it in scores of instances in different portions of our country.

We conclude with the language of Mr. Grey to the Hexam Farmers' Club in England: "The wealth and success of a farmer may be pretty well calculated by the amount of his sheep stock. Sheep are said to be the animals with the golden hoof; they enrich where they go. They not only enrich the master, but the soil."



IMPROVED KENTUCKY SHEEP.

LEICESTER SHEEP.

By Dr. WM. WILLIAMS, of Davidson County.

Mr. Bakewell, a breeder of stock in the shire of Leicester, England, with clear and well-defined ideas in regard to sheep-breeding, created in his own mind an ideal of perfection, and determined to establish a distinct breed of sheep to which he thought no possible objection could be raised. From his own flock, those of his neighbors, and the stock-yards, he selected sheep which he thought were most likely to produce the offspring he wanted. Encouraged by the success of this effort in obtaining a sheep of good form and constitution, he continued his efforts in making selections to cross-breed with. When on a visit to a friend in Lincolnshire who was an eminent stock-breeder, and looking over the flock of sheep his quick eye rested on a ram whose small head, long, round body, short legs, and mellow handling, so pleased him that he prevailed on his friend to part with his best ram. This ram corrected some of the defects of the flock, particularly in the wool, he having a coat of closer texture and of a longer and finer staple. He must have been a splendid one indeed to satisfy Mr. Bakewell, who considered him a prize, and changed his system of cross-breeding to that of breeding in-and-in, for the purpose of permanently fixing the type, which he succeeded in to his entire satisfaction, by making selections of the best of his own flock to breed from, carefully avoiding hereditary defects and diseases. By patience and perseverance his theory of cross-breeding and close-breeding became so well known that his flock of Leicesters soon gained a world-wide celebrity. They were resorted to for the purpose of improving other breeds. The improved Cotswold is a cross between the large, coarse Cotswold and the Leicester, which gave the Cotswold a better form, better constitution, and finer wool. The Oxfordshire is a cross between the Southdown and the Leicester, which has produced a sheep having the color of face and legs like the Southdown, and the size, form and fleece differing but little from the Leicester.

In Tennessee to-day, for general purposes, the Leicester is unsurpassed, if not unequaled, by any other breed of sheep. Compared with the different breeds of fine-wool sheep, they are larger and yield more wool, which is worth more per pound. Possessing a good constitution, they fatten as well as the Southdown, have a heavier carcass, a heavier fleece of wool, also worth more per pound. They are not so large as the magnificent Cotswold, but they surpass them in symmetry of form, in constitution, which insures to them long life, and in the texture of fleece. The ewes are good breeders and good nurses. They very often produce twins, and the twins grow off as well as the single lambs, which are sought for

by breeders and butchers at liberal prices. The wool has been sold in the Nashville market during the last twelve years for from twenty-five to sixty-five cents per pound, as taken from the sheep, and averaging from six to eight pounds each fleece, and in some individual cases as high as twelve and even fifteen pounds. The wool is strictly combing wool, and is used by manufacturers in making the finest blankets and other articles requiring a long, fine fibre. Samples of this wool I have sent you, which you have seen proper to speak of in terms perhaps above its merits.

Were an animal painter to group a flock of Leicesters on canvas, the heads would be small and hornless, the ears long, the legs short and small, all clean of wool and usually of a dusky tinge, and occasionally small black spots on them; the neck small, the brisket deep, the body long and round, the back broad, and the hind quarters square. Dressed in their winter suit, the neck is well protected with the Elizabethan ruffle, and their bodies covered with a soft coat of long, wavy, combing wool, which the March winds toss about like billows.

IMPROVED KENTUCKY SHEEP.

Bred by ROBERT W. SCOTT, Frankfort, Kentucky.

In the communication from Mr. Tom Crutchfield, he speaks of crossing his flock with a buck bred by Mr. Robert W. Scott, of Frankfort, Kentucky, and of the beneficial effects derived from this cross. It occurred to me that this now famous breed merits more attention than it has received from the stock-breeders of Tennessee. I therefore wrote to Mr. Scott to give me a history and description of his flock. In compliance with my request he very kindly forwarded to me the following essay, in which the intelligent breeder will perceive that Mr. Scott has exercised unusual

skill in breeding, and has taken infinite pains to give his flock all the qualities to be desired in sheep for this latitude:

The sheep which are called "native," or "common," in the West, are a hardy and prolific variety; but they are deficient in size, in thrift, and in fleece. Though the general diffusion of them proves their adaptation to the circumstances in which they are placed, yet it is well known that the tendency which all animals have to adapt themselves to climate and subsistence may be materially modified and controlled by judicious crossing, and that the improvement made by these crosses becomes permanent, and thereby stamps distinct varieties of the same class of animals. Chiefly by these influences (crosses, climate, and subsistence) the Bakewell, Oxfordshire, Saxony, and other varieties of sheep, have been produced; and their distinctive features, in congenial localities, are as indelible as those of the stocks from which they were produced. In the same manner, no doubt, still other varieties may be produced; nor does there appear to be any insuperable difficulty in blending, in the same animal, any number of valuable qualities which are not actually antagonistic to each other. These principles extend even to points of fancy merely. For example, some breeds of sheep are hornless, while others have two, others three, and others still have four horns. The Syrian shepherd delights in a breed whose tails are so long and fat that wheels are required on which to draw them over the pastures; but we prefer sheep with short tails, and perhaps a breed might be produced as destitute of them as are dogs of some breeds.

There are other valuable considerations which make the frequent crossing of sheep desirable, if not indispensable. Dr. D. H. Dadd, in his American Cattle Doctor, page 248, says: "It is now a well-ascertained fact that health and vigor can only be perpetuated by not running too long on the same blood. The best variety of sheep I have ever known (putting fineness of fleece aside) was the mixed Bakewell and Southdown." Sir Robert Smith, in his prize essay for the English Royal Agricultural Society, says: "Having tried experiments in every possible way, I do not hesitate to express my opinion that, by proper and judicious crossing through several generations, a most valuable breed of sheep may be raised and established."

The tendency of all improved breeds of all domestic animals to relapse to their original status when they are neglected or abused, is no proper discouragement to this course of improvement; for such a policy would condemn the adoption of all our best breeds of horses, cattle, sheep and hogs; for all have been produced by careful and judicious crossing and selection, and all improvements in stock can be fully maintained only by a reasonable share of the same care and judgment by which the improvement was originally effected.

None of the previously existing breeds seemed to possess all the requirements of sheep for the great West and South; the native sheep were inferior in carcass and in fleece; the Cotswolds were too delicate, especially when young, and their fleeces too open, to bear exposure to our wet seasons; the fleece of the Southdown was too short, and the Merino was too small. Acting on these impressions, the writer has perseveringly endeavored, for over forty-six years, to combine in the same animal the hardiness and prolific quality of the native sheep, the size and the weight of fleece of the Cotswold, and the symmetry of form and delicacy of mutton of the Southdown; and also to combine in the same fleeces the weight and length of the Cotswold, with the thickness and softness of the Merino. My success has been so great, and the sale and diffusion of the sheep have been so wide, that I am gratified at having been able to give, through the popular Report of the Agricultural Department for 1865, the following history of the improvement:

In the beginning, in 1834, about thirty ewes were selected from a flock of unimproved common or native sheep, and they were bred to a very large and fine Saxony or Merino ram, the object being to give, in the offspring, more thickness to the fleece and more fineness to the fibre of the wool. This step was thought advisable before uniting the coarse fleeces of the native sheep with the coarse and still more open fleeces of the large imported varieties, and the effect was satisfactory. The ewe lambs of this cross were bred, on the first of October after they were one year old, to an imported Bakewell buck, of large, full, round carcass, and a heavy fleece of long wool. The ewe lambs of this latter cross were also, in due time, bred to an imported Southdown buck, of large size and high form, the object now being to infuse into the progeny that active, sprightly and thrifty disposition, and highly flavored and beautifully marbled mutton, for which the Southdowns are so justly celebrated. This object was also successfully attained. The wethers of this cross were the delight of the epicure, while the value of the fleece was not diminished, as much being gained by increasing the number of fibres to the square inch as was lost in the length of them.

The next cross was made by a ram which possessed, in combination, many of the good qualities which it was desired to perpetuate in the flock. He was three-fourths Cotswold and one-fourth Southdown; a large, hardy, active sheep, with a thick and heavy fleece, and his progeny possessed the same qualities in an eminent degree. The two next crosses were made by pure-blood Cotswolds; and the next by a very fine full-blood Oxfordshire ram of remarkable softness and silkiness of fleece. They were all animals with short necks, round barrels, broad backs, and full briskets. They added to the flock still more weight of carcass and fleece; while the texture of the latter and the delicate flavor of the former were not perceptibly impaired, and therefore, in the next fall—of 1853—the flock was divided between two fine full-blood Cotswolds.

Every one of these crosses was perceptible in the flock (blended, but still manifest), in the character and habits, as well as in the carcass and in the fleece; but in some a particular cross predominated, which was naturally to be expected, on account of the recentness of the improvement. In order to obliterate these discrepancies, and to produce more complete uniformity in the flock, it was bred, in 1854, to five select rams of my own breeding. The progeny showed a reasonable accomplishment of the object; and though there was some variation in their carcasses and fleeces, still they were in all respects beautiful and valuable animals of their kind.

In the fall of 1855, in order to carry out the same design, I bred chiefly to a mixed-blood ram, whose pedigree showed Cotswold, Oxfordshire, Teeswater, and Southdown blood. He was a highly formed and finely finished sheep, of large size, and a thick fleece of medium length and fineness of fibre, and his lambs possessed great beauty and value.

In 1856 I bred chiefly to a large and fine Cotswold, and in 1857 to him and to a ram of mixed blood, the ewes being so selected and bred as to produce a more complete uniformity in the progeny—those having a predominance of Southdown and Merino being bred to the Cotswold, and those having a predominance of Cotswold qualities being bred to the mixed-blood ram. In 1858 two large and fine rams of my own breeding were used in the same manner, and for the same objects chiefly, viz., to give uniformity and stability to the flock. A few ewes were also bred, in 1858, to a very fine mixed-blood ram, which was a perfect model of symmetry, and which had taken a premium at the State fair in Louisville in that year. In October, 1857, the flock of about one hundred ewes was again selected, and bred with a view to the same object, about one-half being bred to the above premium animal, and the remainder to a fine "Improved Kentucky" sheep, which had a fleece of remarkable length, fineness of fibre, and was of good size and fine form.

By this time these sheep were as essentially alike and uniform, maintained their identity and imparted their qualities as surely, as sheep of any other breed. They had been exhibited with success at many State and county fairs, and had been sold and sent to almost every State in the West and South, even to California; and all which I could raise from a flock of about one hundred ewes found ready sale at the uniform price of thirty dollars for those one year old and under. A lot of these sheep was exhibited at the fair of the Kentucky State Agricultural Society in Paris in 1856, and again at the fair of the United States Agricultural Society in Louisville in 1857, and at each a special premium was awarded them.

Since 1860, well selected rams of my own breeding, and those of Leicester and of Cotswold blood, have been used in such manner as to impart some valuable qualities either to the fleece or the carcass, or to the constitution of the progeny, pure Cotswolds, superior in form and size and fleece, being used.

ADAPTATION TO THE CLIMATE AND SUBSISTENCE OF THE WEST AND SOUTH.

In a country which is comparatively new, and in which stock-raising is conducted on an extensive scale, housing in winter is necessarily expensive and troublesome, and it is impracticable except with those animals which are very valuable and very delicate. Hence the necessity that sheep, which are generally regarded as of inferior importance, should be capable of self-protection, as far as is possible. Indeed, it is doubtful whether any breed of sheep which requires housing in winter can become a generally popular and practically successful breed in the West and South. Living at all times in the open air, their subsistence must be of such a character that they can gather it at all times for themselves, or which can be given them at but little expense or trouble. Climate and subsistence are both known to have material influence even on the fleeces of the sheep; and so much does the character of the food affect the quality of the wool, that the same individual, by a change of food, may be made to produce, at different shearings, wool of widely varied quality and value. Luxuriant and coarse vegetation, grown on limestone soils, is more favorable to the growth of longer and coarser wool; but this tendency may be qualified by judicious crossing, and the growth of fine wool in the West must be sustained by an occasional infusion of fresh blood from the more congenial flocks of Andalusia, Saxony, or New England, and thus a superior article of medium wool may be produced.

The "Improved Kentucky" sheep (that is the name by which they have been long and widely known) have always faced the bleakest winters and the hottest and driest summers without any protection, except that which nature has given them, and yet they have been almost entirely free from all disease, especially from the coughs which often, in winter, affect sheep; and they have been equally free from the snuffles and foot-rot, which have been so fatal to other breeds. In springs, winters and summers of excessive rains, clothed to the knees and to the ears by a thick, long, and impenetrable fleece, they bid defiance to the wind, rain, and snow, and seem at all times to be comfortable and sprightly. In summer they are changed from pasture to pasture, and devour almost every green weed. In winter, short grass is all they require; and if that cannot be afforded them, they will take their corn-fodder with the cattle, and thrive well upon it, though at lambing time, like other sheep, they require a more succulent diet. My stock sheep have never been fed with grain at any time, and when in winter they have been admitted to a hay-stack, they have seemed to prefer the corn-fodder.

THEIR THRIFTY AND PROLIFIC CHARACTER, AND THEIR SIZE.

In the month of August or September, in each year, any aged, inferior, or declining ewes are taken from the flock; and on being separated from their lambs and put on good grass, they soon make excellent mutton.

Only the most healthy, finely-formed, and well-wooled ewes are kept as breeders; and the utmost care has been taken, and no reasonable expense has been spared, to secure rams to breed to them of a similar character, and which would impart some superior qualities to the flock; and no ram has ever been used with any, even the slightest, taint of disease upon him. In this manner, and by frequent crosses with animals which were not even remotely related to each other (except in the cases and for the purposes above stated), and also by crossing with rams of different breeds, without making violent crosses, a degree of health and vigor has been infused into this breed which, I feel assured, is not surpassed, if indeed it is equaled, in any other. So great is their tendency to take on flesh and fat, that ewes which lose their lambs not unfrequently become, on grass alone, too fat to breed; and in several instances I have seen fully three inches of fat on the ribs, after being dressed for mutton, though fed on grass only.

As to their prolific character, native ewes, under favorable circumstances, very frequently, if not most commonly, have twins, and being good nurses, generally raise them well. Notwithstanding the accidents to which they are liable in the absence of a regular shepherd, and despite the rigors of winter endured without shelter, I have often, when the flock of this breed of sheep was smaller than at present, raised one-third more lambs than there were ewes, and have rarely failed to raise as many lambs as ewes even under unfavorable circumstances.

As it is not desirable, for many reasons, that sheep should have the size of bullocks, other valuable qualities have not been sacrificed to obtain a large carcass alone. Perhaps they are now fully as large as is compatible with that activity of habit which is indispensable to a breed which shall come into general use in the West and South. Larger and less active animals will always be more liable to the sheep-bot, and to the depredations of dogs, their flesh will be less captivating both to the eye and to the palate, and the animals will be less capable of roaming in quest of food and water over large pastures and prairies.

None of these sheep have ever been fully fatted, and their weights carefully noted, within my knowledge; but a few years since, I sold sixteen wethers of this breed to a sheep-dealer and farmer, at fifteen dollars per head, and he wrote me: "I sold them at twenty-five dollars per head, and the person I sold them to did well with them. They took the premium over a fine lot of Cotswold wethers. I consider them better than the Cotswold for mutton and wool, and think they feed more kindly than any sheep I ever saw. They were pronounced by all, the best sheep in the market." I extract from my sheep register the following weights of some of them taken in the month of August: A yearling ram, 174 pounds; a two year old ram never shorn, 224 pounds; a grown ewe, 162 pounds; a ewe lamb, 114 pounds; all weighed off of grass, without extra keeping of any kind.

WEIGHT AND CHARACTER OF THEIR FLEECES.

The fleeces of these sheep vary from eight to fifteen, and in one instance seventeen and a half pounds, the whole flock of over one hundred breeding ewes having averaged over eight pounds of merchantable wool, free from burs, tags, etc.; and though not washed on the sheep's back, still clean enough for domestic manufacture. Though the fleeces of these sheep (like those of all other breeds) are not perfectly uniform as to length, thickness, and fineness of fibre, still there is a general uniformity, and the diversity is of no practical disadvantage. Their wool is longer than that of any sheep, except those of the Cotswold family, and is equal in length to that of many individuals of that family, while it greatly excels the wool of the Cotswold in fineness and softness of fibre, and in the number of fibres to the square inch on the sheep's back. In some individuals it is wavy or curly, but it is never harsh or wiry. Except the face and the legs below the knees, the whole body is covered with a close and compact fleece, which, when full grown, leaves no open line on the back, as with the Cotswold, but gives a perfect protection to the sheep, and causes them to present a smooth, handsome, and portly appearance. Their fleeces have enough of grease and gum to preserve the softness and vitality of the fibres, even to their ends, but not so much as to give the sheep a dark and dirty appearance. Their wool receives domestic dyes without any washing whatever, is easily cleaned on the sheep's back, and when it is washed in soft water, with soap, it readily becomes very white, receives chemical dyes, and preserves its lustre perfectly. It has generally commanded from three to five cents per pound more than any other best combing wool in the markets of the vicinity; and I desire to refer to the opinions of several extensive and intelligent manufacturers who have bought it frequently. Mr. L. C. Stedman, of Georgetown, says: "As regards the wool of your sheep, I think very highly of it, being strong and well adapted to our use for domestic purposes; cards and spins well, and makes a good strong fabric." Mr. J. W. Martin, of Midway, says: "It is in all respects superior wool, and peculiarly adapted to the manufacture of jeans and linseys, and we have paid more per pound for it than for any other wool." Mr. S. L. Brownell (an extensive and experienced manufacturer of Louisville) says: "I noticed particularly its working qualities, and believe that no cross of wool could be effected that would improve its working character. It seems to have length, strength, and texture, and at the same time firmness, fineness, and softness of staple, which render it peculiarly adapted to Southern and Western manufacture and wear."

Mr. Joseph Gorbut, of Woodford county, says: "I can and do with pleasure say, that we prefer the wool of your 'Improved Kentucky' sheep to that of any other we have ever used. When we take into consideration the fineness of the texture, the length and evenness of the staple, the

weight of the fleece, its clearness of gum (losing less in scouring than any other of any kind), we can say that we prefer the wool purchased of you to any other we use; and in consequence have for years recommended our customers to supply themselves with your 'Improved Kentucky' sheep."

LETTER FROM HENRY STEWART.

AUTHOR OF "THE SHEPHERD'S MANUAL."

A gentleman of prominence, residing in Nashville, has for several years been studying the capabilities of the mountainous regions of East Tennessee with a view of ultimately engaging in sheep husbandry there should his investigations prove satisfactory. He recently addressed a letter to Mr. Henry Stewart, asking for some specific directions as to the management and care of a flock in that region. Mr. Stewart replied at some length, and his suggestions are so practical that the gentleman has kindly placed the letter at my disposal, which I subjoin, believing that the information contained therein will be of benefit to those contemplating going into sheep raising in the mountainous regions:

WESTWOOD, N. J., Feb. 28, 1880.

My Dear Sir—I have to apologize for keeping you waiting so long, but I have been so busy the past week or two that I have scarcely known how to turn around. So many people write me on similar subjects, and my editorial duties, together with my farm here, on to which I have removed the past week, keep me going day and night.

I have given your letter close consideration, and reply in detail as you request. I know of no better sheep country in the world than the one you refer to. The Western plains are excellent, but my flock of over 5,000, which I have there now, requires about 400 square miles of range to feed on. On the contrary I have seen tracts of pasturage in East Ten-

nessee and Western North Carolina, on the table lands, that will feed two or three sheep to the acre by keeping a winter pasture of blue or native grasses untouched from August for the flock. The soil, water and climate are all that can be wished, and if you proceed with caution, and at first get experience, and don't hope to make money the first year, I have no doubt of your success. Your plan is sound, and I am sure you have, as you say, studied my little book with profit. I would get 100 or 200 native ewes, pick out those with neat heads, deep flanks, the broadst backs, shortest necks, and not too leggy. These will be easy feeders, and more gentle to control than the deer-legged and thin-backed ones, which are restless creatures. You can as easily manage 200 as 100, and the expense of management will be halved. If you can find any with brown or spotted faces, choose those, and take ewes with fleeces free from coarse hair on their buttocks and shoulders. These are apt to convey a bad quality of wool to the lambs; these hairs are called "kemp," and depreciate the price of the wool, being also hard to breed out. You should have a good man to help you, but you will probably be able to pick up a boy cheaply near you who is accustomed to keeping his father's flock, and will be more apt and less fussy than an English shepherd. These require two or three years to lose old notions and take on our ways, and are very obstinate besides. I have a Pennsylvania man with my flock in Kansas, whom I trained in this way when living in Pennsylvania some years ago, and he is now able to go along alone, working my flock on shares. You should not have lambs until the weather is warm, and there is good grass. April would perhaps be the best time, but you could do an excellent business in raising early lambs for Washington market possibly by having some come in February, or sooner even. All that you would need would be some cheap shed and a yard for shelter for the dams. I will gladly post you on this subject when you wish. You are near enough to markets to raise mutton and wool both, and a half-bred Merino is not a bad mutton either.

The run now is for combing wool, that is Merino wool three inches or two and a half in length, for manufacturers have begun to comb even Merino wool, and the half-bred is called delaine wool, and brings the highest price in the market Choose rams with wool three inches long when spread out, fine and well curled, and with plenty of yolk, but not too much wrinkled, also with deep sides, and with wool on the legs and bellies, also on the heads and faces. The weight should be be at least 120 pounds. These are now the profitable kind. The Cockrills should be able to furnish you with these. When you get fully into your business, you can pick out such a ram as you would like.

All the shelter you will want is a few rough sheds to preserve from rain and snow. A piece of woodland with serve-pole and thatched sheds, that you and your man can make, will be amply sufficient. It would be safe, and perhaps necessary, to grow about one bushel of corn per head

for your flock, and get in about fifty or one hundred pounds of hay per head as well, in stacks near where you keep the sheep. A run in a corn stubble with half a pint of corn (one ear) for each sheep per day, and some hay ought to keep them in good order. But you can get a fine winter pasture by seeding down some open sheltered woodland with orchard and blue grass, one-half bushel of each per acre. Cut the hay in June, and let it grow up without feeding until other ground is bare. The sheep may go into green grass to their bellies in this way in November and later, and feed well until spring. They will even get enough feed when grass is covered with snow by pawing the grass clear for themselves. The corn and hay are only for emergencies, but I would feed half a pint of corn anyhow; you will get it back in the wool.

Success in sheep-keeping is gained by constant observation, and the instant reparation of any thing that is going wrong. The chief things to avoid are damp pastures, stagnant water, banks of streams, too much shelter; and the chief needs are pure spring water, dry soil, and pure, fresh, cool air. With these requisites and protection from dogs (a shotgun and a bottle of strychnine, *quietly* used where it will do the most good, will do for the dogs), you should succeed without doubt, and if even you fail wholly the first year, it will be the way to success the next. Increase the flock cautiously; buy young ewes with good teeth and good fleeces; use very few medicines, give salt regularly; don't coddle lambs or ewes; make them tame and friendly with you, so that they will follow you and put their noses in your hands, and you can do any thing with them.

"The good shepherd loves his sheep, and they follow him;" this is true now as ever. Lastly, don't invest more than a fourth of your capital to begin with, salt away the balance, and the second year begin to use it, as you can see clearly to do so.

If any points need further elucidation, write again. In this business any time is good to begin. If you begin in the fall you have to buy feed; if in the spring you can raise it.

WOOL AND MUTTON.

Mr. James Geddes, of New York, has recently written the following interesting communication, which we find going the rounds of the press. There are many facts detailed in this letter to which our farmers may wish to refer in the future:

In 1836 our production of wool was 12,000,000 pounds; in 1860 it had increased to 60,000,000. The extra demand for cloth occasioned by the war, and the protective tariff, so stimulated this industry that, according to the estimates made at Washington in 1867, the annual production had risen to $147,000,000 pounds, and in 1877 to 208,000,000, that is from 1860 to 1877, inclusive, the increase was at the rate of 246 per cent., while in the preceding twenty-four years, the increase was about 40 per cent. Since 1836 the number of sheep in the old States has constantly declined, and they have now less than one-half the number they had then. The increase in the new States and Territories has compensated for this. In 1862 Hollister & Dibbles took 400 pure Mercer ewes to California; since then the production of wool in that State has reached 54,000,000 pounds in one year. Texas, which in 1845 had only native Mexican sheep, by infusing Merino blood, has raised its flocks until they number 4,000,000 of animals producing wool, much of it equaling the wool of Ohio. The traditional Southern hatred of sheep, as expressed by John Randolph, must be dying out when such men as Alexander H. Stephens and Senator Gordon, have embarked in the business of wool growing.

Since 1809 our improvement in the sheep that produce clothing (fine) wool has been very great. Then $9\frac{1}{2}$ per cent. of unwashed wool to the live weight of the animal was the standard; in 1865 the best recorded yield was 21 per cent., and the heaviest fleece 27 pounds. Three rams bred since 1873 in Vermont have yielded fleeces averaging 26.3 per cent. of unwashed wool, while the average weight of the fleeces was $34\frac{1}{3}$ pounds. The fineness of the fibre equalled that of the Saxon super-electa. Breeders of Australia and South America are importing these animals to improve their flocks. The Secretary of the National Wool Growers' Association has lately taken 200 of our sheep to Japan for the government of that country. We have made equal progress in the production of long-combing wool, or mutton-sheep husbandry. In 1860 a very little long-combing wool was raised in Kentucky and Maryland, but the proprietors of our worsted mills had to go away from home, chiefly to Canada, for 2,500,000 to 3,500,000 pounds annually, the impression then being general that these wools could not be grown in this country. Now Ohio, Pennsylvania, Michigan, Maine and other States are producing, it is estimated,

10,000,000 pounds annually—equal in quality to the best English wool. Wool yielded by cross-bred Merino and mutton sheep is held by the manufacturer to be of great value, producing a combing wool that gives softness and cloth-like character to our fabrics not found in those abroad, as admitted by the best London and Paris tailors.

We are now raising good mutton and supplying a rapidly increasing market. In 1839, on the great market day before Christmas, 400 sheep fully stocked the market at Brighton, near Boston, Mass. Last year 272,000 sheep and lambs were slaughtered at the Brighton Abattoir, 20,000 of them coming from Kentucky. This wonderful advance in the production of mutton and wool in the last twenty years has grown out of the war and a protective tariff. Mr. McKean, in his address at the annual banquet in Philadelphia last fall, of the National Wool-Growers' Association (to whose latest Bulletin I cheerfully acknowledge obligation for most of the figures of this article), answered the question, "What does the wool come to?" by saying that the annual product of the wool manufacture of the United States is estimated by Mr. Lorin Blodget as follows:

The six New England States	$127,500,000
New York, New Jersey, Pennsylvania and Delaware	98,340,000
Twelve Western States and Utah	41,200,000
Twelve Southern States	8,830,000
Colorado, Oregon and Washinton Territory	7,250,000
Total	$284,120,000

Capital employed by manufacturers he estimates at near $300,000,000, giving work to nearly 200,000 persons, "for it is not alone the mill hands, but the workmen who make the repairs and renew all the machinery, the miners who get out the hundreds of thousands of tons of coal for the engines, the teamsters and railway men who carry the wool to the mills and the manufactured goods to the market, and the farmers and farm hands and herdsmen who raise and tend the sheep and clip the wool. There is no end to the ramifications." He goes on to say: "In nearly all staple goods for wearing apparel our mills are abreast of any in the world; the exceptions are the foreign goods, which some wealthy people still have a weakness for—like the family that bought a beautiful Axminster carpet under the impression that it was a French moquette. It was a great pet and pride in their house until they saw its mate at the Centennial among American carpets; then they were disgusted. Their beautiful French moquette had been made at Smith's mills, at Yonkers, where they weave as much Axminster every year as they do in all France, and more than they do in Great Britain."

The improvement of American machinery for manufacturing wool into the most desirable fabrics deserves attention. The power looms that now

weave carpets had no existence when Mr. Bigelow first entered upon his career as an inventor; only plain fabrics, of comparatively simple figures, were woven on power looms, and "he put in operation the first successful power loom known in the industrial art of weaving coach-lace, wire-cloth, ingrain carpets, tapestry carpets, Brussels and Wilton carpets, and silk brocatel." On the latest of his looms one operative has woven 73 yards of Brussels carpet in ten hours, and 50 yards is an ordinary day's work. On hand looms the weaving of brocatel costs in Lyons 60 cents per yard; on power looms in Connecticut it costs but 15 cents.

The cheapening of carpets by the inventions of Americans may be stated as follows:

"By the power loom one woman in a given time will weave as many yards of ingrain as four men by hand; as many yards of tapestry as six men by hand loom; and as many yards of Brussels carpeting as ten men and ten boys by the hand loom."

The result of these and other improvements in machinery is a great fall in prices as well as improvement in quality. By the books of leading mills it appears that in ingrain carpets "prices of 1879 are 12½ per cent. less than in 1860, higher prices for labor then being paid in 1879 than in 1860, the prices for wool being about the same. In dress goods the prices have fallen off 25 per cent." John and James Dobson, of Philadelphia, manufacture 30,000 pounds of wool every working day, and Philadelphia has become the largest wool manufacturing city in the world. Eighty per cent. of the wool now manufactured in this country is produced by our own flocks, and soon we will produce a full supply, and ere long export wool, if the present tariff laws are unaltered. The importation of wool in the form of manufactured goods is rapidly falling off. In 1860 our importation amounted to $37,973,190. In 1878, our population having increased not less than 12,000,000, we imported only $25,230,154. In certain classes this falling off of importations is very marked. In carpets the importation in 1878 was not one-fourteenth the value of the importations of 1872. Dress goods, in which the foreigners still lead our manufacturers in the estimation of certain wealthy consumers, are no longer imported as extensively as formerly, their value having fallen in 1878 to $12,000,000 from $20,000,000 in 1872.

In December, 1865, the now famous joint convention of wool-growers and wool-manufacturers was held in Syracuse, N. Y. There and then these two great industries, that before had been antagonistic, learned that they had common interests, and that neither could prosper at the expense of the other. The wool-grower must have a market at home, and the wool-manufacturer must have a home-grown supply to depend upon in case of a foreign war or any other cause cutting off a supply. Since that time these industries have acted in concert, and have been heard in Congress, and thus far have been able to prevent hostile legislation. The wonderful progress made, to the great benefit of the whole nation, is be-

fore us, and our flock owners having surmounted the difficulties of changing the native flocks of Tennessee into producers of long wool and mutton, we look forward to profitable production of wool, combined with mutton, in Tennessee, as has long been the case in England, and abundant rewards to the owners of flocks of fine-wooled sheep in their new homes.

RAMBOUILLET SHEEP IN FRANCE.

In a most interesting address delivered 24th of March, 1880, in Rochester, New York, by Mr. Markham, President of the New York State Sheep Breeders' and Wool Growers' Association, detailing what objects of interest to sheep-breeders he saw in a trip around the world, I find the following reference to the Rambouillet flock of France, which is a translation of thirty-one answers in French to as many questions propounded by Mr. Markham.

RAMBOUILLET, February 4th, 1880.

SIR—I have the honor to give you below replies to the thirty-one questions addressed to me in your letter of the 29th of January last.

1. The Rambouillet flock was established in 1776.

2 and 3. At the beginning it was composed of forty-two bucks and three hundred and thirty-four ewes.

4. These animals were taken from ten of the best Spanish sheepfolds, according to the recommendation of the king of Spain himself, and were chosen from among elite subjects.

5. The weights of the unsheared bucks were approximately 110 to 120 pounds.

6. That of the ewes, also unsheared, was about 72.5 to 88 pounds.

7. The fleece of the bucks weighed about 8.8 pounds.

8. That of the ewes was about 7.7.

9. According to samples which form the collection of the sheepfold, the wool of the bucks had a length of 55 millimetres 9-10 (2.2 inches); this measure taken upon the fibre in a state of nature, i. e., not stretched,

in such a way as to destroy the sinuosities or undulations. The crimp of the wool had 15.3 undulations per centimeter (39.25 per inch), and in hundredths of millimetres, 2.16 diameter (1-1175 inch). Wool of the ewes had 52.7 millimeters (2.07 inches) length of fibre, 39.8 crimps per inch; 2.06 mm. (1-1235 inch) diameter.

10. In 1802 a new importation was made from Spain to Rambouillet, numbering six bucks and forty ewes, as subjects for experiment, and as terms of comparison with animals resulting from the first importation. They were found inferior, and they do not appear to have been kept very long.

[NOTE.—For the dates of 1860 and 1880 I shall substitute respectively 1867 and 1878—those of our last two universal expositions—because in a report to the minister I was called upon to make a comparison of the flocks of these two epochs. This report will furnish me some precise figures upon which I shall comment when indicating what may have been the condition at the dates you mention.]

IN 1867.

11. The bucks weighed, with their fleece, 192.5 pounds.

12. And the ewes 135.3 pounds, also with fleece included.

13 and 14. The fleece of the bucks weighed in grease 11.77 pounds; that of the ewes 9.13 pounds. In 1860 the animals must have been heavier and the fleeces of less weight.

In 1860 the lengths of fibre for the bucks was 2.29 inches, the crimp had 41 undulations per inch, and the diameter 1-1159 inch. For the ewes these were respectively: length of fibre, 2.2; 45 undulations per inch and 1-1198 inch diameter.

16. From 1840 the object was to produce Merinos of which the animals were at the same time valuable for slaughtering and for the production of wool. The fleece ceased to be the entirely predominating consideration in the choice reproducing animals. The chief end was plump and well developed forms, and by a rich regime, animals were obtained, about 1850, having very large weight, but which were very exacting and less robust, and the fleece of which was not in relation with this weight, either as to quantity or quality of wool.

17. The end in view the mutton, had almost destroyed the folds, which, with the exception of a few subjects, scarcely comprised more than those of the neck, and the result was to diminish the value of the animals in the eyes of foreigners. Shortly after 1850 these errors were renounced and efforts were made to bring the flock back to its true and ancient type, by making choice more with regard to wool and repudiating the exaggeration of development in the choice of reproducing animals, and the superabundant and onerous feeding that had been practiced to attain this end. The Negretti type again acquired importance and the folds they bore were no longer excluded, but sought after rather as characteristics essential to ani-

mals furnishing the richest fleeces, and corresponding better with the desire of foreigners, who came to Rambouillet to seek reproducing animals. It was especially since 1867 that the improvement of the flock has realized marked progress with regard to production of wool, and a return to their primitive aptitude to live exclusively on pasture and to support intemperate conditions, and the privations resulting from dry seasons and the natural aridity of pasturage.

IN 1878.

18. The weight of the bucks with their wool was 159.06 pounds.

19. That of the ewes with their wool was 115.17 pounds.

20. The bucks give annually a fleece of 16.7 pounds.

21. The ewes annually give of wool 11.04 pounds.

22. The fibre from the bucks had a length of 2.6 inches; the crimp of the wool had 39.26 undulations per inch, and the diameter was 1–1076 inch.

For the ewes the length of fibre was 2.33 inches; the crimp had 45.76 undulations per inch, and the diameter was 1–1245 inch.

23. A Merino for countries where the production of wool is the principal end in view should have folds rather numerous than large about the neck, one fold of horse-shoe form about the tail and a few only on the body. If some countries reject animals with folds, it is said to be because of the scab which occurs there, the seeds of which find lodgment and ulcers which form between them.

24. In France there exists an erroneous desire to secure very plump Merinos, without folds, which on this account are very exacting. European countries ordinarily attach importance to large Merinos having a moderate number of these folds. The Cape of Good Hope seeks good form and few or no folds. The same is true of Australia. South America demands folds above all, and prefers animals of average form, and the same is true for North America. I generally find that it is wrong to prefer a large animal to a small one. Merinos being destined to live upon pasturage, if they have a reduced form they are more easily and more surely satisfied in the countries to which they are transported. If its development is inferior as compared with the richness of the pasture it will find in abundance, it will enlarge, will naturally progress, will be profitable, and will be exposed to no miscalculation; while if, on the other hand, those of too large form be chosen they will be exposed to the chances of inability of being satisfied by the resources at their disposition, they will decline, be subject to dangers, give place to deception and be a cause of loss. I submit in principle that upon a given extent of pasturage it is impossible to maintain quite as great a weight of animal by adopting subjects of small form, as in taking the large types, and no one can contest that small Merinos in larger number, making together the same weight as the larger ones, will furnish more of wool each year and less of losses.

Sheep giving large and heavy fleeces are every where in demand; but the mistake is sometimes made of attaching importance simply to the absolute weight of the fleece, making no comparison between the weight of the wool and that of the animal. It is thus that some persons who seek Merinos even with reference to wool alone, prefer a buck of (120 kilos) 264 pounds, giving (8 kilos) 17.6 pounds of wool to another of (60 kilos) 132 ponnds, which furnishds a fleece of (7.5 kilos) 16.5 pounds, saying that the first gives more wool than the second, taking no account of the respective weights of the subjects.

I have always combatted and shall always combat such reasoning, because a Merino of 60 kilos 132 pounds, with its 16.5 pounds of wool, is far superior to that of 264 pounds with a fleece of 17.6. In fact, in pasture, two small Merinos of 132 pounds will live easily upon the space required by a single buck of 264 pounds, and they will give 15 kilos (33 pounds) of wool each year against 17.6 furnished by the large buck.

Let us also consider the sheep at Rambouillet according to the quantity of wool they give each year for 100 of their weight, and we would say that, according to the preceding hypothesis, Merinos of 60 kilos (132 pounds) furnished 12.5 per cent. of wool, while the large sheep of 120 kilos (264 pounds) gave but 6.66 per cent. This latter is therefore inferior to the other with the special regard in question.

I profess the opinion that a Merino, strong and well constituted, with large, short legs, head also large and short, and body low, with proper ancestors, can scarcely ever be too small, because the smaller the subjects the more hardy they will be, and the more wool they will give in proportion to their weight.

Another advantage of small Merinos is that they are more fertile and are longer lived. They are better adapted to multiplication and the creation of flocks. Importance is given and will always be given to the length of the wool. However, this coniideration is now of less importance since it is now possible to comb relatively short wools.

Fine wool is also always sought after; but extreme fineness does not outweigh all other considerations, since it has become possible to spin fine with average wools. And since extreme fineness excludes abundance of fleece, a heavy fleece of strong wool and average fineness is preferred.

25. As a general rule we avoid giving a ewe a buck of near relation. By near relation I mean the father and his daughter, the mother and her son, the brother and sister.

But if exceptional qualities to be perpetuated are found in a male and female of these relations, we should not hesitate to couple them if we failed to find in non-relatives the same suitability (convenance); for consanguinity is not to be avoided except in case of individuals having a constitutional vice common to the family.

26. Purchasers of our wool (and they have no interest in exaggerating the yield) declare that the fleece comprising the whole of the wool (body, belly, legs, head, etc.) yield, according to the year, 30 to 33 per cent. of white scoured wool. This is the same proportion as when the animals arrived from Spain in 1786.

27. Very much folded animals which furnish a super-abundance of wool are sometimes weakened in their constitution and appear as though exhausted by this exaggerated production of wool. Our shepherd, in such case, says the wool eats them *la lime les mange.*

But apart from these very exceptional cases, and which never represent one per cent., the folded animals are very hardy, very resistant, and are capable of supporting privation.

On the whole, they are less finely formed than sheep without folds; they are more angular, are less developed, less plump; but when the meat is no consideration these characteristics should not be considered as defects, but the opposite.

28. Folds on sheep imply closer, more settled wool, fibres closer to each other and stronger, and indicate a more abundant fleece, notwithstanding the wool is shorter.

The fleece of folded animals covers all parts of the body more completely than that of subjects without folds; it is better closed externally, that is to say, it is with more difficulty penetrated by dust, seeds, etc., which may annoy the animal and soil or alter the wool.

29. Folds on Merinos are above all found about the neck, in front of the shoulders; to proscribe them would, therefore, be to exclude the best wool producers.

But if the folds of the neck are too large, they present an inconvenience. With age, the skin of these folds becomes callosed. This change in the nature of the skin brings about a degeneracy of the wool, which then sticks to the skin (*se rapproche du poil*), which is an unfavorable quality, without, however, producing a sufficient motive for the rejection of a buck having this peculiarity. These large folds on an animal are always to be regretted, and, all other qualities being equal, we prefer those which have only small or average-sized folds, which never cause the callosity of the skin, and the sort of protuberance which is the consequence thereof.

30. In the Merino race the buck generally weighs three when the ewe weighs two. Supposing the animals charged with one year's wool, a weight of 75 kilos (165 pounds) for the buck, and 50 kilos (110 pounds) for the ewe, seem to me sufficient, if we have in view a flock destined to live exclusively on pasture, and to be especially devoted to the production of wool.

For an arid country I would even advise confining it to 60 kilos (132 pounds) for the buck, and 40 kilos (88 pounds) for the ewe.

When I advise small subjects, if wool be the special end in view, I am governed by statistics of the flock covering twelve years. In dividing the animals into five categories according to weight, I have observed that the lightest give a quantity of wool equivalent to 12.38 per cent. of their weight; the next, 11.41; the average, 11.14; then 10.38, and finally the heaviest, 9.51 per cent.

I have further found that fleeces of animals of the "average" section each weigh 125 grammes (275 pounds) more than those of the section comprising the heaviest animals.

31. From statistics of twelve years, it follows that, on an average, of the 100 ewes which we cause to be "served," it is found that 83 1-10 become with lamb (pregnant), and that they give, including twins, ninety-two lambs.

I shall stop, sir, believing I have answered each of your questions. If I have badly comprehended your requests, and made omissions, I beg that you will call my attention thereto in order that I may repair the defects in my replies. I have been pleased with the impression which your visit to our flock produced, and it is an inducement for us to persevere in the way we have followed for some time.

I beg you to accept, sir, with my thanks, my respectful and devoted homage. The director, BERNARDIN.

IMPORTATION OF WOOL.

I am indebted to the Hon. Joseph Nimmo, Jr., of Washington city, Chief of the Bureau of Statistics, for the following, which arrived too late to be inserted at its proper place on page 26:

Statement showing the Quantities and Values of Raw Wool Imported into the United States from each Foreign Country, from 1874 *to* 1879 *inclusive.*

Countries from which imported.	WOOL, RAW, IMPORTED DURING THE FISCAL YEARS ENDED JUNE 30.											
	1874		1875		1876		1877		1878		1879	
	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.	Pounds.	Dollars.
Argentine Republic	8,502,627	1,276,456	8,999,693	1,241,916	7,376,249	1,030,278	8,166,025	1,056,262	9,489,121	1,191,429	6,929,514	791,883
Belgium	58,717	12,090	604,510	165,187	139,196	32,361	93,108	17,343	244,699	48,846	29,494	3,963
Brazil	1,430,144	211,955	1,142,750	153,717	937,158	126,960	969,526	118,209	798,998	97,127	260,025	32,194
Chili	2,310,511	290,168	3,616,299	433,591	3,217,536	391,310	2,600,643	294,586	2,856,771	314,712	3,773,604	395,645
France	714,004	115,029	2,515,236	326,439	2,972,589	427,310	469,160	52,788	913,662	105,390	2,500,694	286,612
Germany	39,737	10,909	91,127	23,774	258,509	47,230	90,106	20,833	267,727	51,858	44,746	8,638
England	7,966,382	1,859,254	11,882,207	2,753,544	16,934,294	3,426,994	14,170,171	2,821,259	18,387,554	3,750,762	16,742,071	2,136,819
British North Amer. Prov.	3,001,892	1,077,864	3,018,547	1,097,592	3,174,066	1,083,711	2,343,079	682,586	2,502,207	750,286	2,546,270	576,203
British Poss'ns in Africa and adjacent islands	4,622,273	818,229	6,286,849	1,150,442	2,484,664	424,769	3,063,557	485,710	3,935,705	599,516	1,060,352	151,847
British Possess'ns in Australasia	3,905,671	1,030,056	9,461,644	2,652,661	2,416,156	596,386	2,936,892	711,845	2,085,869	528,135	399,518	98,873
Greece	881,530	91,815	67,961	7,426	1,091	121	657,648	68,340	282,200	29,326	.....	.....
Italy	46,691	5,837	75	14	47	9	50	5	.....	.....	.....	.....
Mexico	1,173,099	112,226	1,095,282	119,534	838,798	85,887	1,405,983	119,708	835,487	72,216	819,784	66,300
Russia on the Black Sea	3,118,930	545,088	3,814,950	642,237	1,972,624	320,822	1,503,703	199,253	.....	.....	1,786,893	233,177
Hawaiian Islands	132,785	21,488	217,990	24,769	15,498	1,992	950	227	207,820	21,153	125,530	12,498
Turkey in Asia	894,154	107,548	200	40	513,881	67,310	106,786	11,879	249,672	29,667	593,617	100,508
Uruguay	4,094,275	660,136	863,440	129,876	750,219	105,888	2,185,884	298,765	5,273,092	758,212	1,113,231	108,673
All other countries	46,119	4,158	1,223,000	148,500	640,261	78,279	1,407,921	197,346	118,495	14,380	279,812	30,912
Total	42,939,541	8,250,306	54,901,760	11,071,259	44,642,836	8,247,617	42,171,192	7,156,944	48,449,079	8,363,015	39,005,155	5,034,545

The *United States Economist*, of recent date, says:

There never was a time at this period of the year when stocks of domestic fleece and pulled wools were sold up as clean in all markets, and were it not for the large quantities coming from all foreign countries it is fair to conclude that prices would have ere this risen to exalted figures. Prices are advancing in the markets abroad for all classes of wools adapted to our necessities, in consequence of the large demand for this country, and it is getting more difficult every day to obtain the grades of wool we require, unless at prices which will materially enhance the cost of the scoured pound. There is no safety left manufacturers but to diversify production (if a modification of the wool tariff is not reached), because it is now clear that any class of fine wool when scoured will cost from 80c. to $1.15 this season, while last year mannfacturers were enabled to purchase the bulk of supplies at from 40c. to 75c. scoured. The cause of this enormous advance is founded on demand and supply. We do not grow sufficient wool for the wants of manufacturers, and the result is seen in the sharp competition to obtain the necessary supplies adapted to the wants of our woolen mills.

INDEX.

A

PAGE

Abel, First Shepherd 8
Adaptability of Tennessee..... 5
Adaptability for Sheep..... 31
Advantages of Tennessee..... 21
Advantages of Sheep Culture...204
Africa, Sheep Growing..... 22
Allman, Geo. T., Letter.....262
America, Sheep Growing..... 22
Analysis of Excrement..... 77
Analysis of Food..... 98
Angora Goat.....208
Anatomy of Sheep.....157
Answers to Circulars.....178
Appendix 247
Argonauts..... 11
Australia 23

B

Bakewell Sheep.....115
Baling Wool.....205
Banffshire Sheep..... 62
Barns..... 53
Barns, Yards..... 91
Barns, Number of Sheep in..... 95
Basin, Silurian..... 42
Bedding for Sheep..... 96
Beets for Food.....101
Beets, Cultivation and yield.....104
Beggars' Lice..... 79
Bessarabia..... 24
Beunos Ayres..... 24
Blood, its Composition..... 76
Bogs, unfit..... 33

PAGE

Bones, Size of..... 76
Book Farming, value of.....202
Breeding Sheep..... 14
Breeding, In-and-in.....55, 63
Breed, Best.....135
Breeds, Favorite..... 29
Breeds to Mix..... 59
Breeds to Convert..... 61
Breeds, Popular.....114
Broom Grass..... 40
Bucks, Angora.....232
Bucks..... 49
Bucks, too young..... 58
Bucks, When to Separate..... 51
Bucks, Number of Ewes to...131, 7
Butter from Sheep..... 8

C

Calycanthus..... 79
Carcass.....136
Carpets 175
Carter County..... 33
Castration 75
Cedars, a Protection..... 89
Census..... 30
Cheap Lands..... 38
Cheese from Sheep..... 7
Circulars 28
Climates..... 32
Cockrill, Mark R..... 21
Competition 24
Conclusion..... 202
Confinement, Injurious..... 107

PAGE

Consumption of Mutton and Wool 25
Corn as a Food 97
Cost 28
Cost of Feeding 42
Cost of Raising 177
Cotswold Sheep 115
Countries best Adapted to 18
Crosses 34
Crossing, best 46
Crosses, Breeds 45
Crosses, five to purify blood 64
Crutchfield, Tom, Opinion 37
Crutchfield, Tom, Advance Sheets 247
Crutchfield, Tom, Letter 253
Cud 158
Culling flocks 137
Cumberland Mountains for Sheep 18

D

Darwin on Sheep 34
David, King, a Shepherd 9
Davis, Dr. J. B., Letter 209
Dedication 3
Degeneration 133
Deihl, Israel S., Letter 239
Demand for Sheep 15
Diseases of Goats 216
Diseases of Sheep 157
Diseases unknown here 180
Diversity of Sheep 6
Divisions of Flock 80
Docking 74
Dogs 20
Dogs, effects Injurious to Industry 29
Dogs, effects on Fattening Sheep. 106
Dog Law 149
Dogs, Shepherd 150
Dogs, How to Train 150
Dogs, Answers to Correspondents 152

PAGE

Dropping time 50
Dropping, When best 93

E

East Tennessee 38
Economist, U. S. Circular 294
England 12
Epidemics 23
Europe 22
Ewes for Lambs 48
Ewes for Breeders 52
Ewes for Suckling 54
Ewes, best 140
Excrements 77
Exemptions from Executions ... 207
Exportations 12

F

Factories 178
Farms, Sheep 68
Fattening for Mutton 102
Fattening for Market 107
Fattening for New York 108
Feeding Stock Sheep 14
Feet, Diseases of 167
Felting 170
Fences, Good 70
Fences, Portable 84
Fibre, Wool 148
Fleece 7
Flesh 76
Flocks, to perfect 58
Folds 70
Food 6
Food, varieties necessary 40
Food, Winter 40
Foster, J. W., Letter 263

G

Garget 55
Geddes, James, Letter 284
Gestation 48
Gibson, Capt. Thomas 134
Goats, Angora 208

PAGE

Goats, Breeding.....211
Goat Breeding in Tennessee.....229
Goat Breeding, at what age.....225
Goats, Breachy.....228
Goats, Crossing.....219
Goats, Description.....214
Goats, Diseases.....216
Goats, Fleece.....239
Goats, Gestation.....215
Goats, History of.....212
Goats, Importation.....213
Goats, Pelts.....225
Goats, Products.....220
Goats, Skins.....217
Goats, Wool.....218
Golden Fleece..... 11
Grades.....131
Grasses best adapted to Sheep... 32
Greece..... 11
Green Food.....106
Green Soiling..... 81
Growing Interest..... 29
Gutters useful in Sheds..... 93

H

Heat..... 31
Herbage..... 78
Herd's-grass..... 41
Hughes & Ronald, Circular.....241
Hungary..... 23
Hurdles..... 84

I

Imports of Wool..... 26
Improvements in Sheep..... 9
Improvements in Husbandry..... 13
Impurities in Wool.....173
Increase of Sheep..... 25
Inducements, to engage in.....112
Intestines.....159
Isothemus..... 36

J

Jacob's Ruse..... 8
Japan Clover..... 4

PAGE

Job, a Sheep owner..... 9
Johnson County..... 33
Jones, D. N., Letter.....261

K

Kentucky, Sheep Growing.....174
Kentucky Sheep.....274
Knoxville..... 36

L

Lambs disowned..... 53
Lambs, Driving injurious..... 67
Lambs, Profits of Early..... 66
Lambs, Sales..... 43
Lambs, Spring..... 51
Lambs, Treatment..... 53
Lambs, Value..... 5
Laurel, a Poison.....206
Leicester Sheep.....115, 273
Limits of Sheep Raising..... 28
Location.....136
Lofts, use of..... 92
Longevity.....134

M

Marking, How and when..... 74
Marks, Various kinds..... 49
Matlock, H. H..... 37
Memorandum Book, how kept... 50
Merino.....60, 118
Merino Rams.....138
Metamorphic Rocks, their effects..... 33
Mexico.....11, 24
Middle Tennessee..... 42
Milk, Ewe..... 8
Mohair.....216
Mohair, Dealers in.....222
Mohair, Markets for.....226
Mohair, Preparation of.....226
Mohair, Value of.....221, 224
Moisture Injurious..... 18
Moors..... 12
Moses, his flocks..... 9

PAGE

Mountains as Sheep walks..... 17
Mustard as food..... 82
Mustard, How to grow.....102

N

Natives, Value of..... 34
Nativity of Sheep..... 8
New Yorker, Rural, Circular....173
Numbers..... 29
Numbers of Sheep.....175

O

Oil Cake, its food value..... 95
Overdone..... 25
Overstocking.....46, 79

P

Packing Fleeces..... 145
Pagans..... 9
Parsley as food..... 78
Pastures..... 17
Pastures, Changing..... 88
Pastures, Poor.....18, 79
Pasturing, how..... 75
Peas.....40, 81
Pelt rot.....168
Philips, Jos.....233
Physic..... 80
Plateau..... 34
Poisons.....206
Portugal..... 10
Prerequisites for success..... 68
Prices, average.....26, 175
Profits..... 12
Profits in Tennessee..... 16
Profits from Wool..... 19
Profits from Mutton..... 43
Profit and Loss.....111
Protection..... 36

Q

Questions and Answers.....18, 183

R

PAGE

Racks.....72, 90, 92, 96
Raising Sheep.....110
Ram Changing..... 56
Ram, Merino.....138
Rambouillet Sheep.....287
Remedies.....162
Requirements for Sheep raising.. 27
Review of Sheep Husbandry in Tennessee..... 27
Rim Lands.....40, 90
Rise and Progress..... 27
River, Tennessee..... 41
Roots..... 99
Rot, Lands liable to..... 164
Russia..... 84
Rye Pastures..... 81

S

Salting Sheep..... 73
Schedule Questions and Answers.....181
Scott, Robt W, Letters.....211, 274
Scrubs..... 34
Shawl, Cashmere.....244
Shearing Lambs and Sheep..31, 143
Sheep, Sick, Care of..... 88
Sheep, killed.....179
Sheep, Stock..... 97
Sheds..... 87
Sheltering..... 38
Shepherds..... 9
Shropshire..... 61
Size and Shape.....6, 135
Skin, its structure.....170
Slopes.....34, 80
Soils..... 69
Sorghum..... 81
South, The, Extracts from..153, 230
Southdowns.....60, 114, 139
Spain..... 10
Statistics.....22, 177
Steppes..... 24
Stewart, Henry, Letter.....33, 281

PAGE

Stinting 49
Stratton, Lorenzo.....211
Straw..... 99
Strays..... 20
Sumner County..... 61

T

Table Land..... 18
Tables.....140
Tables, Voelker & Lankester.....100
Tags..... 73
Tails..... 7
Tarentine Sheep..... 11
Tariff.....176
Teeth..... 79
Temperature..... 32
Tennessee..... 20
Thibet Goat.....210
Titles..... 38
Troughs, Portable..... 87
Turnips.....52, 85, 101
Twins, To secure..... 56
Tyrian Purple..... 10

U

Unaka Mountains, its grasses.... 32
Understocking.....17, 79
United States..... 24
Urine, its value..... 94
Uses of Sheep..... 7

V

Valley of East Tennessee..... 35
Value of Sheep..... 16
Value of various breeds relative.140
Van Goat.....228
Virginia..... 33

W

PAGE

Warren County..... 41
Washing Sheep.....142
Watchfulness, necessary..... 80
Water Supply..... 80
Weaning Lambs..... 65
West Tennessee..... 43
Wheat as Pastures..... 105
Williams, Dr. Wm.....273
Winds..... 90
Winter Feeding..... 97
Winter Management..... 89
Wool Breaks..... 80
Wool, its Classification..171, 2, 173
Wool and Cotton..... 147
Wool, The Crop of.....179
Wool, Merino.....174
Wool, its fibre.....147
Wool, Importations..293
Wool, Shedding..... 89
Wool, Shipping.....146
Wool, Structure.....170
Wool, its uses.....147
World's Fair, Tennessee Wool at 21
Worms in Sheep.....160
Wounds 166

Y

Yield of Wool..... 42
Yolk, its use..... 76
Yolk, its composition.....171
Youatt, Work on Animals..... 23

Z

Zone, Wool, of the world..... 23

SHEEP HUSBANDRY:

A WORK

PREPARED FOR

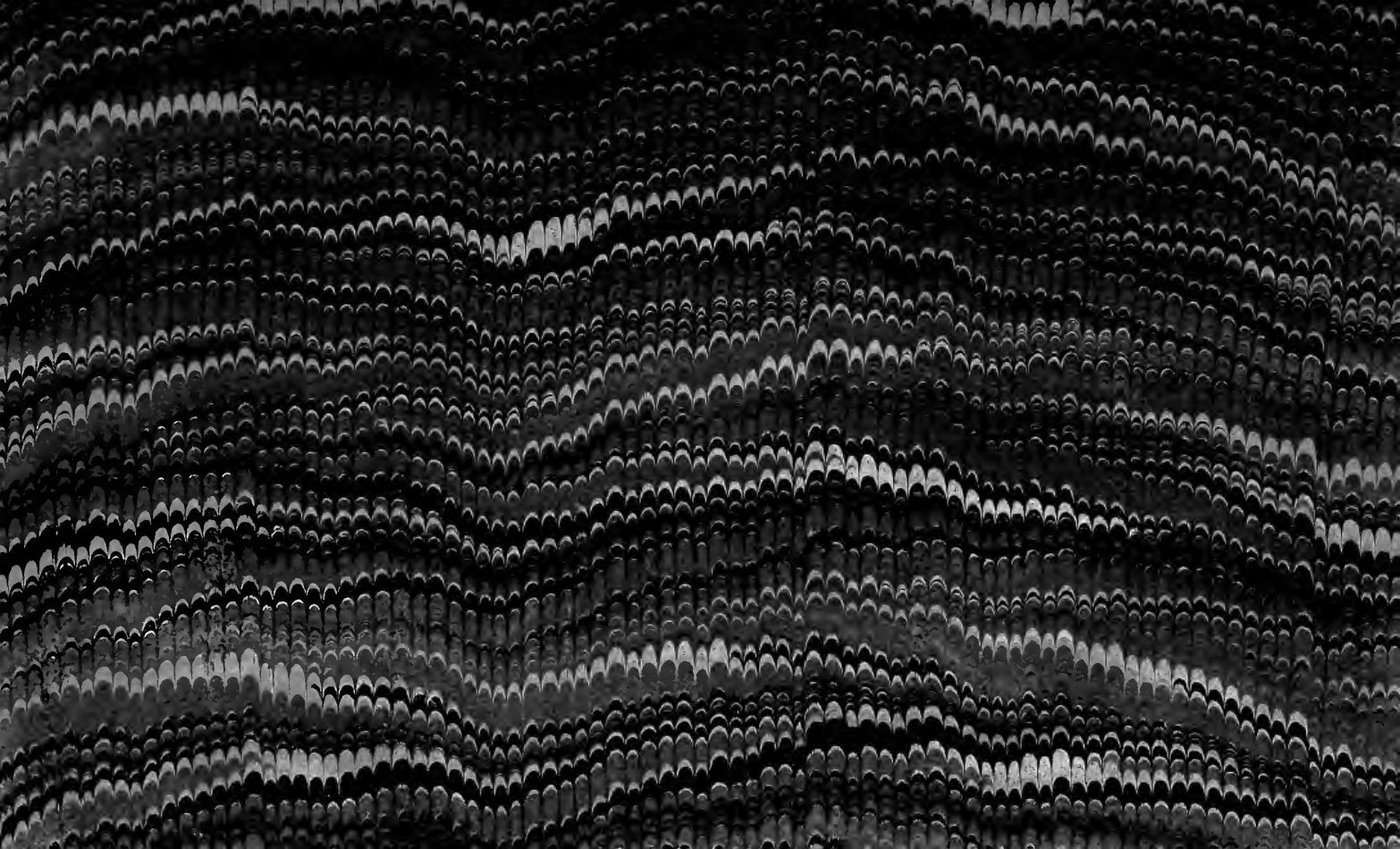
The Farmers of Tennessee.

BY

J. B. KILLEBREW, A. M., Ph. D.,

Commissioner of Agriculture, Statistics and Mines for the State of Tennessee.

NASHVILLE:
TAVEL, EASTMAN & HOWELL.
1880.



LIBRARY OF CONGRESS
0 002 847 746 6